33rd Year

SEPTEMBER, 1949

RUBBER AGE

THERMAX AND

NATURAL RUBBER

THERMAX permits high loading with good QUALITY at lowest cost. Mixes easily into rubber.

TODAY'S BEST DOLLAR VALUE

R. T. VANDERBILT CO. INC.

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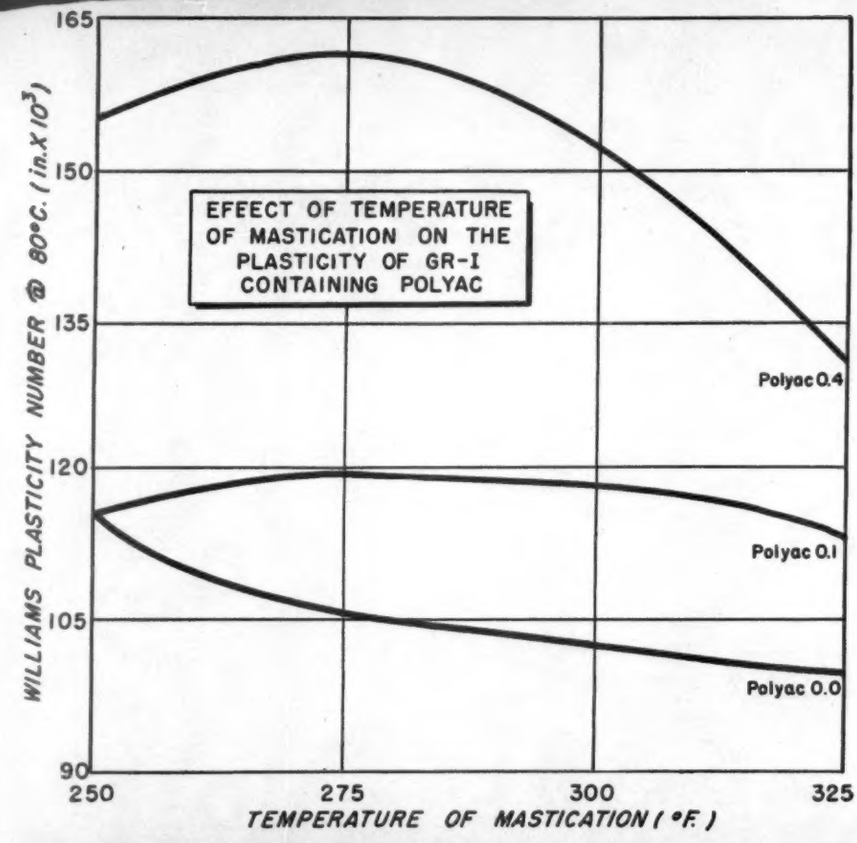
To stiffen uncured GR-I stocks use DU PONT POLYAC



The use of Polyac can help you reduce creasing and splice defects in GR-I inner tube stocks—minimize cold flow of uncured mold preparations. Useful either to offset heat-softening of GR-I or to actually increase stock stiffness, Polyac is readily adaptable to your plant requirements.

As shown in the graph, a small amount of Polyac reduces the sensitivity of GR-I to variable processing temperatures. Even over the temperature range of 250° to 325° F., essentially constant plasticity was maintained through the use of only 0.1 part of Polyac. And, with larger amounts, the stiffness of the uncured stock can be substantially increased. For example, the data in the graph show that mastication at 275° F., GR-I containing 0.4 part of Polyac had a Williams plasticity number of 161 compared with a plasticity number of 106 for the control stock containing no Polyac.

In using Polyac as a stiffening agent, you collect a dividend, since it is also an effective accelerator-activator in GR-I stocks. Its use results in higher modulus and tear strength—lower permanent set.

Additional data on the use of Polyac as a stiffening agent in GR-I can be found in Report BL-232. Extra copies are available.

• • •

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DU PONT RUBBER CHEMICALS

E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.

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REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

THE RUBBER AGE, published monthly by the Palmerton Publishing Co., Inc., Printing Office, East Stroudsburg, Pa. Editorial and Advertising Offices at 250 West 57th Street, New York 19, N. Y. Entered as second class matter October 20, 1933, at the Post Office at East Stroudsburg, Pa., under the Act of March 3, 1879. Subscription in United States, $3.00 a year; Canada, $3.50; Foreign, $4.00. September, 1949, Vol. 65, No. 6.

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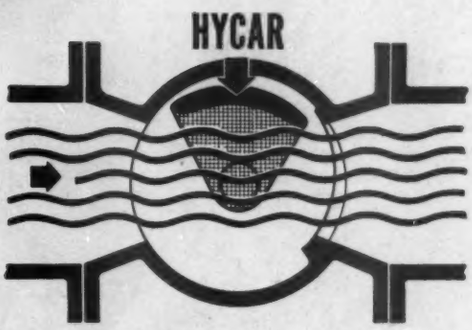
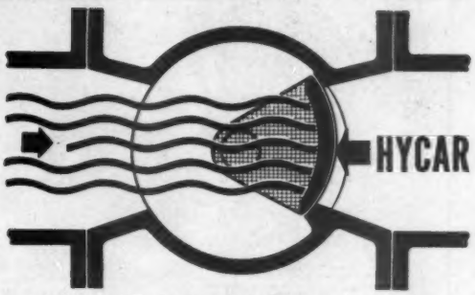
DETROIT

DeZurik Easy Operating Plug Valve, DeZurik Shower Co., Sartell, Minn.



Valve Open. The eccentric lifts the plug face from all contact with the seat. Line pressures cannot distort or stretch the metal-cored rubber sealing member. Merely a quarter-turn of the lever establishes full-open flow.



Valve Closed. The resilient, Hycar face of the plug makes drip-tight contact with the seat in the body. Perfect closure is insured even when flow includes rust, scale, sand, abrasives or foreign matter.

Flow control valve with a leak-proof "heart"

THE valve you see here insures a drip-tight shut-off for gases or liquids, vitally important in many processes. It is absolutely leak-proof even when the flow includes rust, scale, abrasives or foreign matter.

Here's the "secret." An exclusive eccentric principle releases the face of the valve from all contact with the seat, except when the valve is closed. The "heart" of the valve—the plug—is faced with Hycar providing the leak-proof closure, the valve's big feature.

Hycar was chosen because of its resilience and its resistance to the widest range of chemical and petroleum products. Hycar can be bonded to the metal, which is necessary in molding to the core. Equally important, Hycar resists dimensional changes and has minimum cold flow under load.

Perhaps Hycar can solve a problem for you, or improve a product. Hycar is oil-and-gas-resistant, light in weight. It resists heat, cold and aging. It has high tensile strength, good resilience and extreme resistance to abrasion. Compounds can be varied from extremely soft to bone hard, and made in many colors.

Versatile Hycar is used as a rubber base material . . . as a plasticizer for vinyl resins . . . as a modifier for phenolics . . . as an adhesive base . . . as a latex for coating or impregnating. Find out how it may help you, profitably. Please write Dept. HB-9, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

Hycar
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American Rubber

B. F. Goodrich Chemical Company

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GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers

Philomath—*A lover of mathematical figures!*

Philblack* O—*The HAF black that figures so successfully in "cold" rubber.*

Problem: Find the carbon black that is the most effective reinforcement for low temperature rubber.

Solution: Philblack O plus "cold" rubber produces the highest quality tire treads ever offered to the public.

Corollary: Philblack O also brings out excellent tread qualities in GR-S and natural rubber.

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*A Trade-mark

Your case is stronger with Plio-Tuf

AMONG the many potential uses of **Plio-Tuf**—Goodyear's new combination of resin and rubber — is the manufacture of a wide range of cases and luggage of various types, as well as football helmets, textile spools, chemical containers, etc.

Plio-Tuf—a combination of natural or synthetic rubber and **Pliolite** resins—can be varied in compounding to produce desired characteristics in the final material. It is hard and has high impact-resistance—resists shattering. Characterized by low water-absorption, **Plio-Tuf** also has very good chemical resistance. In processing, **Plio-Tuf** has excellent moldability, and can be cut, sawed, machined, sewed on automatic sewing machines. Available in any color, **Plio-Tuf** can be buffed to a high gloss — is tougher, more durable and costs less than many of the materials which it replaces.

Plio-Tuf compounds are easily prepared by conventional plastic and rubber procedures, using either the two-roll mill or the Banbury. Ask for full compounding details on **Plio-Tuf** — Goodyear's use-proved combination of **Pliolite** resins and rubber. Write to:

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USE PROVED *Products*

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Plio-Tuf, Pliolite—T.M.'s The Goodyear Tire & Rubber Company

Improve rubber base soles with new Good-rite Reg. U. S. Pat. Off. RESIN 50

GOOD-RITE Resin 50 is an improved stiffening agent for natural and American rubber products. In addition, it gives many *extra* advantages.

For example, when a soling compound is loaded with ordinary fillers, to obtain a desired hardness the specific gravity will be raised with a reduction in flex life, abrasion resistance and quality. Using Good-rite Resin 50 as a stiffening agent the soling compound can be given the desired hardness, as well as exceptional flex life, low specific gravity, better abrasion resistance and excellent low temperature properties.

Good-rite Resin 50 is made as a white, free-flowing powder. Its size is such that 85 per cent will pass a 100 mesh screen. It can be compounded in a wide range of attractive, permanent colors.

Investigate Good-rite Resin 50. It can simplify your processing—and help you produce better products with increased profits.

For complete information, please write Dept. CB-5, B.F.Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

5 big profit-making advantages...

Hycar Reg. U. S. Pat. Off. *American Rubber*

- ★ STIFFNESS WITH LIGHT WEIGHT
- ★ LEATHERY LOOK AND FEEL
- ★ EXCEPTIONAL FLEX LIFE
- ★ PERMANENT COLOR
- ★ EXCEPTIONALLY LONG WEAR

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Big or Small... Calendered Products are Better with Mt. Vernon Fabrics

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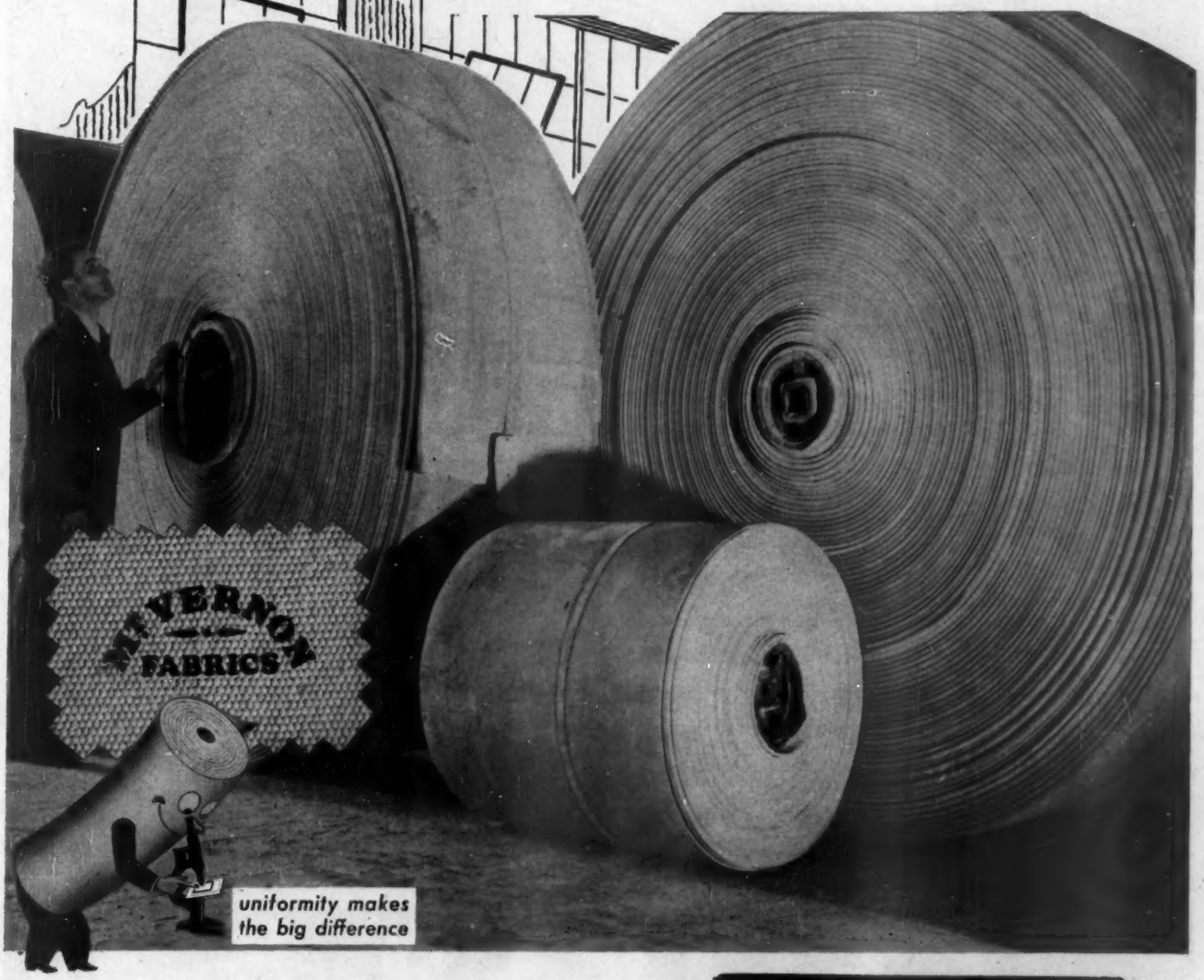
Mt. Vernon fabrics are made from top grades of cotton, under strict laboratory controls, to assure you the high degree of uniformity.

For smoother, faster production of better rubber products—specify Mt. Vernon.



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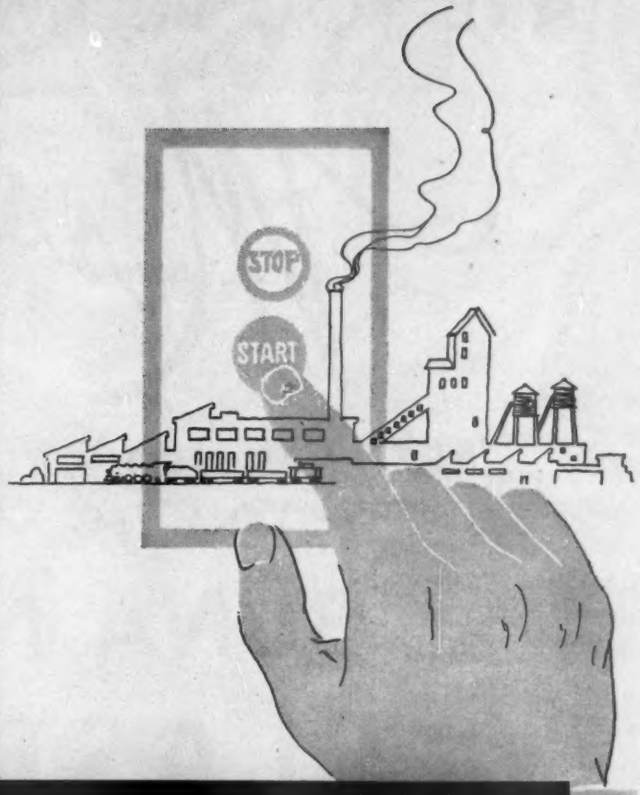

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What do you need... facilities for research... or highly specialized equipment for production?

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If you make a product that requires an adhesive with special characteristics... check into the Flintkote line. You'll find a versatile list of latex compounds, aqueous dispersions of rubbers and resins and solvent cements. You'll find products for bonding and laminating... as well as coating, saturating and sizing.

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PANAFLEX BN-1

will do the job better – at a substantially

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PANAFLEX BN-1 is an economical, light-colored plasticizer for synthetic rubber – especially butadiene-acrylonitrile type.

This new hydrocarbon plasticizer *completely* replaces dibutyl phthalate in nitrile rubbers – produces soft vulcanizates having high tensile, excellent elongation, and very low modulus. **PANAFLEX BN-1** plasticized stocks possess good ageing properties, superior electrical characteristics, and show good gasoline and oil resistance.

Why not find out for yourself *today*

SPECIFIC GRAVITY	0.9440
COLOR, NPA	1½
REFRACTIVE INDEX	1.553
DISTILLATION, °F	560-730
ODOR	Excellent
VISCOSITY, SSU @ 100°F	240

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BEACOFINISH—a unique family of coating materials conceived to give your products greater durability and eye appeal. These highly concentrated wax emulsions that can be diluted with up to four parts of water can be used with the utmost safety and economy.

BEACOFINISH is therefore of four-fold importance to you:—

1. ***It Protects*** your products against their natural enemies—air, sunlight, moisture and excessive handling.
2. ***It Improves*** the appearance of your product for its uniform coating stimulates greater consumer interest.
3. ***It's Economical*** because its high dilution potential (without losing efficiency) allows one gallon to cover 15,000 sq. ft.
4. ***It's Safe*** being a wax in water emulsion, it eliminates the fire and health hazards of volatile-solvent based finishes.

BEACOFINISH can be applied by dipping, sponging, spraying or brushing—dries in about 20 minutes—faster if force-dried—to give a hard protective coating of great elasticity.

BEACOFINISH may be ordered in Neutral or Black, in varying degrees of luster from brilliant to dull. It is so concentrated, from one drum you can obtain potentially up to five drums of superior coating for your products.

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Scene at Teluk Merbau Estate, Malaya, showing Pepton 22 dispersion being added to natural rubber latex before adding coagulant.

Pepton*22 Plasticizer

CUTS BREAKDOWN TIME AT LEAST 50%

May be added to the latex at the plantation

When you use natural rubber which has had Pepton 22 Plasticizer added to the latex prior to coagulation, you enjoy all its benefits and are saved an extra step in the compounding room.

Use of Pepton 22 reduces the amount of mastication required to achieve the desired plasticity by at least 50%. Pepton shows considerable action at temperatures as low as 212° F. but exerts its best effect at temperatures above 240° F. Pepton 22 also improves processing qualities and has no effect on the physical or aging characteristics of the rubber.

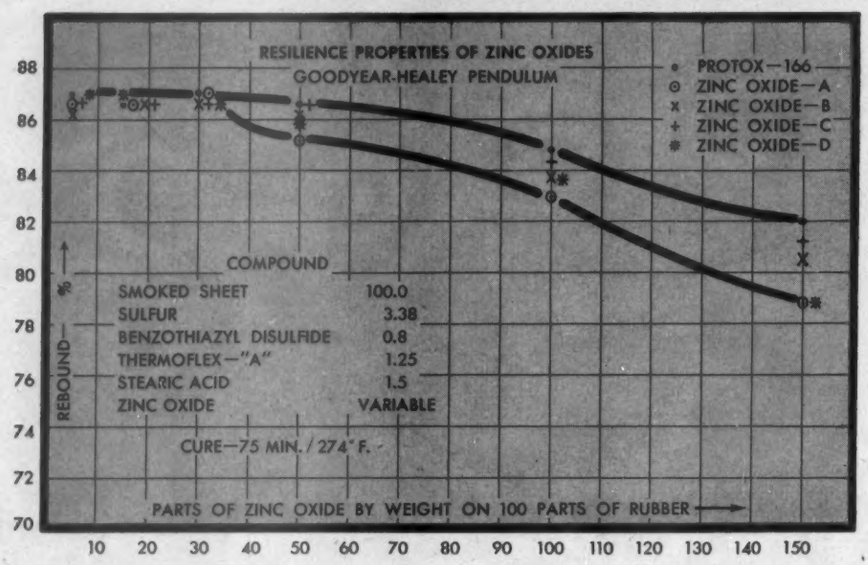
*Reg. U. S. Pat. Off.

AMERICAN Cyanamid COMPANY
CALCO CHEMICAL DIVISION
RUBBER CHEMICALS DEPARTMENT
BOUND BROOK, NEW JERSEY

Calco

In Your High Zinc Compounds ADD MORE PENDULUM REBOUND with PROTOX-166*

(The Surface-Coated Zinc Oxide)



Protox-166 is outstanding among Zinc Oxides for its good rebound properties. The higher resilience it imparts to compounds is reflected in lower hysteresis loss, less heat generation, better performance and longer service life of rubber products.

Protox-166 provides compounds with higher rebound than other oxides, primarily because its propionic acid treatment results in superior dispersion and internal lubrication. The higher the loading, the greater the resiliency advantage for **Protox-166** compared with a range of representative untreated Zinc Oxides, as shown in the chart. Even 150 parts of **Protox-166** on 100 parts of natural rubber provides a resilience within 5% of a "pure gum" compound.

*U. S. Patents 2,303,329 and 2,303,330

PROTOX-166 GIVES YOU ALL THESE ADVANTAGES

COMPARED WITH OTHER ZINC OXIDES

LESS MOISTURE PICKUP

LOWER DRY BULKING

SPEEDS MIXING
- Permits larger master batches
- Faster incorporation
- Better dispersion
- Lower power consumption

INHIBITS SCORCH

IMPROVES TUBING AND CALENDERING
- Provides plasticizing effect
- Imparts smoother tubing
- Reduces die swell
- Cuts calender shrinkage
- Gives cooler running stocks

HELPS REINFORCEMENT
- Improves tensiles
- Raises tear resistance
- Increases modulus
- Steps up resilience

For further details, see "The Activator," Vol. 9, No. 1.

If you are not yet using Protox-166, may we send you samples?

HORSE HEAD PRODUCTS

THE NEW JERSEY ZINC COMPANY

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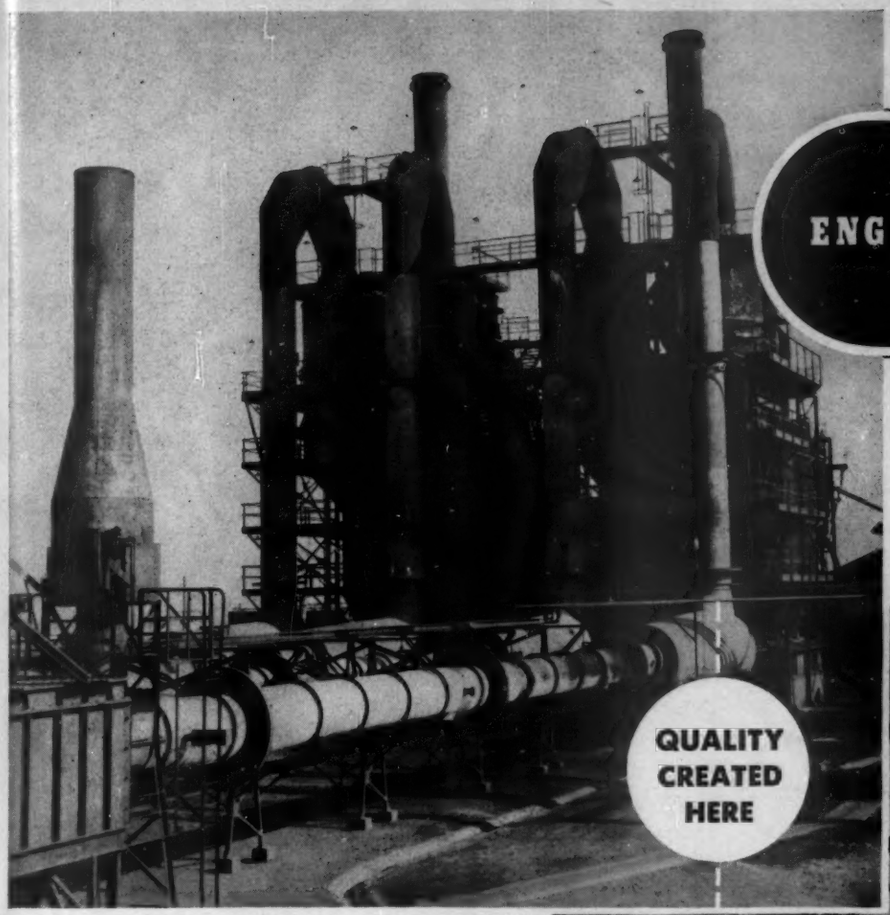

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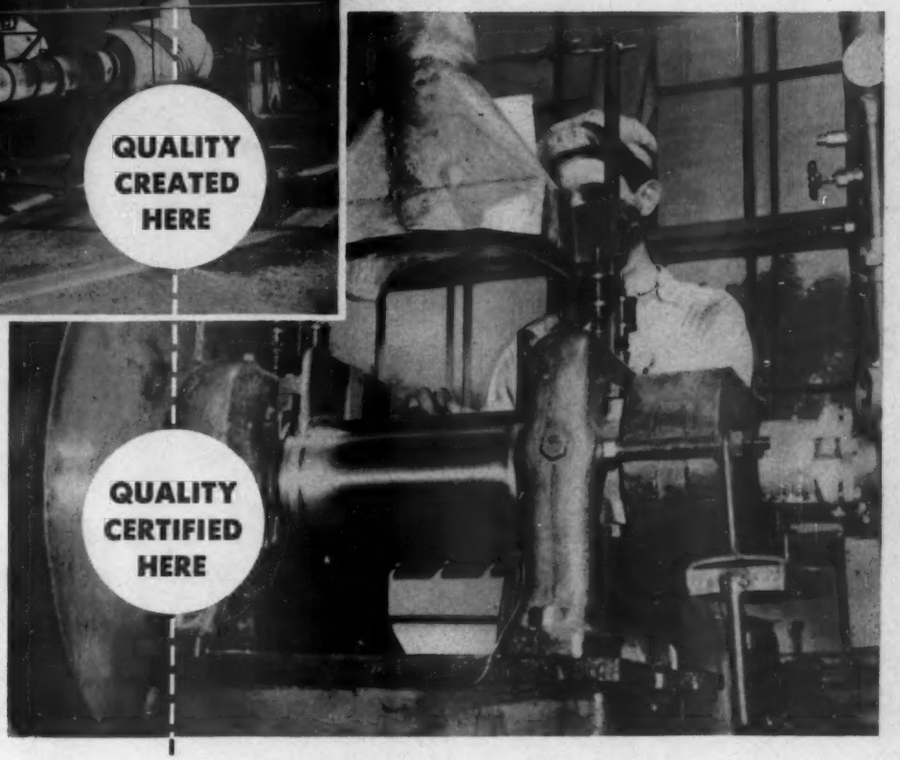
The quality SRF Furnace Black



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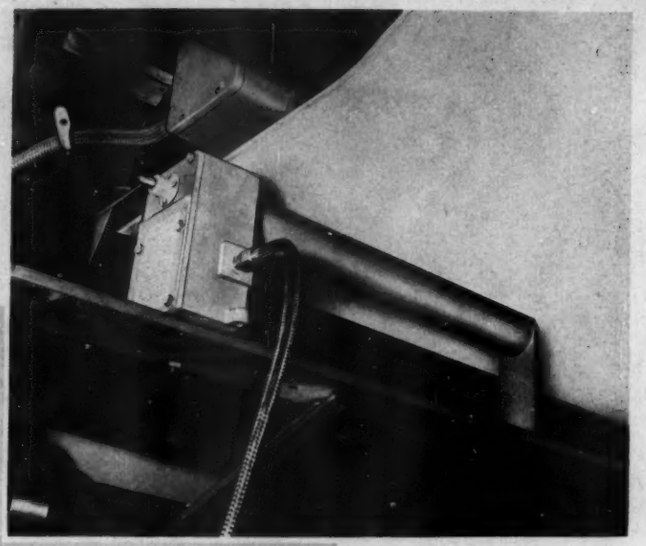
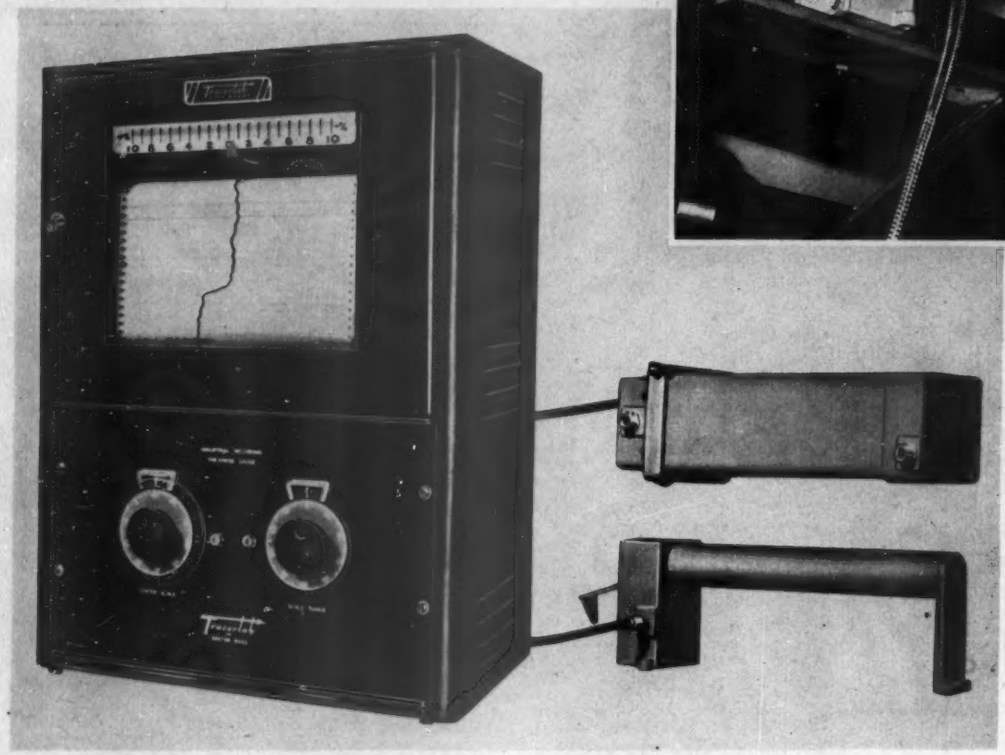
The Tracerlab
BETA GAUGE

FOR PLASTIC FILM AND SHEET . . . .
RUBBER . . . . COATED TEXTILES





A typical Tracerlab Beta Gauge installation for measuring thickness of sheet material.

ELIMINATE OFF-WEIGHT REJECTS . . . . . IMPROVE QUALITY CONTROL

SAVE RAW MATERIALS . . . . . DECREASE VARIATIONS ACROSS SHEET

WITH THIS NEW NON-CONTACTING THICKNESS GAUGE

The Tracerlab Beta Gauge is a completely new and unique instrument for measuring and recording weight per unit area or thickness of various materials directly on the production line. It uses beta radiation from Oak Ridge produced radioisotopes to achieve a high degree of accuracy and sensitivity and is unaffected by variations in chemical composition of the material being measured. This is a non-contacting type of gauge designed for the severe operating conditions usually encountered in production operations. In addition to the recording type, a non-recording industrial model and a laboratory model of the Tracerlab Beta Gauge are also available.

Let us know your gauging problems and we will gladly advise you how the Tracerlab Beta Gauge can help you.

Write for Beta Gauge Bulletin R-20

A FEW TYPICAL USES

Measuring weight per unit area or thickness of the following:

VINYL PLASTIC FILM

SHEET RUBBER

CELLOPHANE

FOAM RUBBER

PHOTOGRAPHIC FILM BASE

RUBBER TIRE STOCK

COATED TEXTILES

ACETATE FILM

ADHESIVE COATED PLASTIC FILM

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NOW...CALCINED MAGNESIA

in Polyethylene bags

ready to throw into the Neoprene Mix

Baker can now supply you Magnesium Oxide, Neoprene Grade, in Polyethylene 5-pound bags packed 10 to the carton.

These highly protective bags are great time savers. They are light and easy to handle. They are always clean; need not be emptied. They dissolve right in the mix.

Moreover, these bags give added protection to the most sensitive ingredient that you use in compounding Neoprene: Magnesium Oxide (Calcined Magnesia).

The package Baker selects for Magnesium Oxide has to be good. It must protect the product from moisture with the same care that Baker uses to protect the uniformity of its Calcined Magnesia through controlled temperatures. With Baker's special electric furnaces, calcining temperatures never vary more than 5 per cent.

Temperature control, uniformity of product and packaging to prevent moisture infiltration are three of the important factors to assure Calcined Magnesia that is trouble-free for Neoprene compounding.

You get all three of these important features when you buy your Calcined Magnesia from Baker.

For test samples and prices write: J. T. Baker Chemical Co., *Executive Offices,* Phillipsburg, New Jersey.

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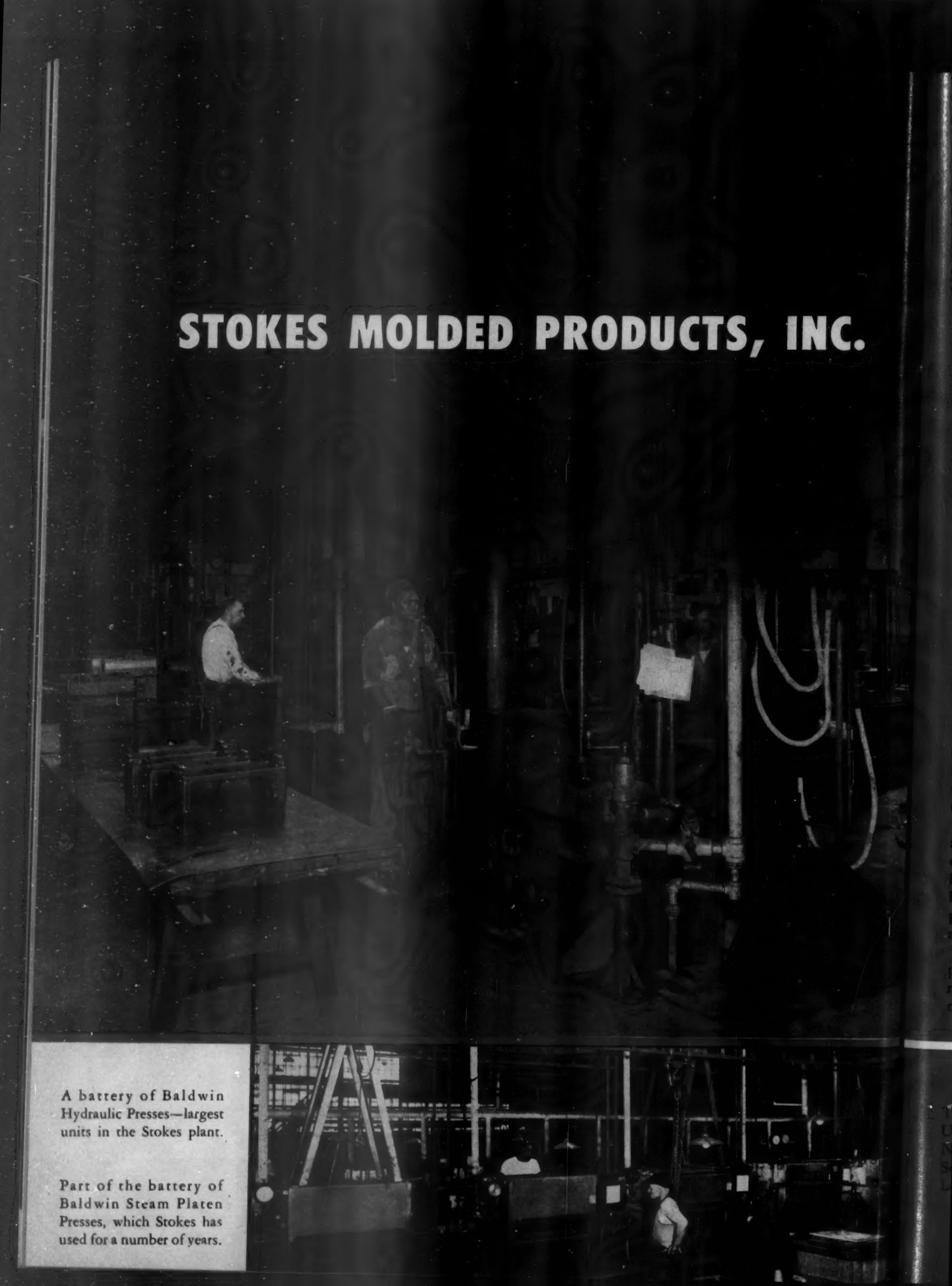
STOKES MOLDED PRODUCTS, INC.



A battery of Baldwin Hydraulic Presses—largest units in the Stokes plant.

Part of the battery of Baldwin Steam Platen Presses, which Stokes has used for a number of years.

does big things with its battery of "BALDWINS"

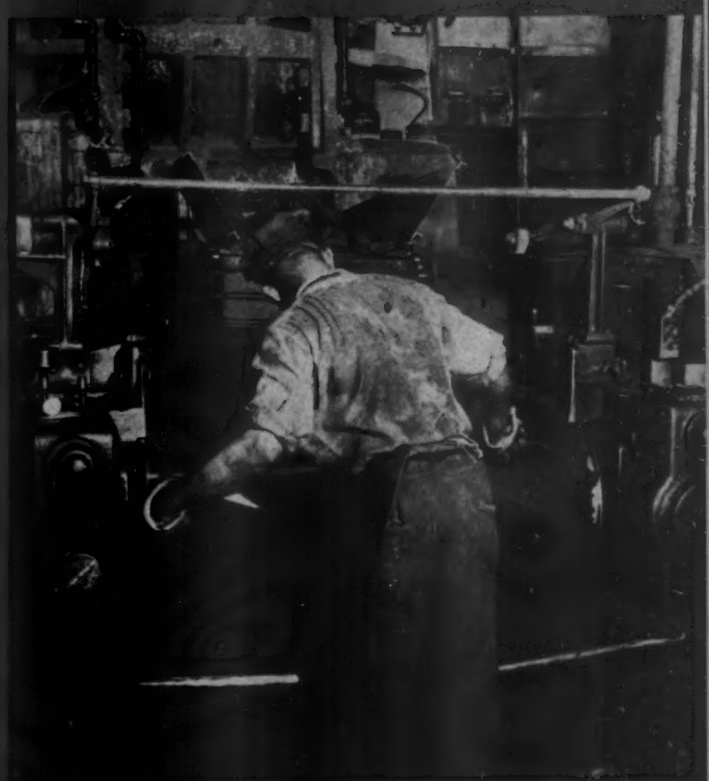
Large battery boxes—a Stokes specialty, produced on their Baldwin presses.

Some of the largest hard rubber products produced in the industry are formed by Stokes Molded Products, Inc., on their Battery of Baldwin Presses.

These presses—the biggest units in the plant—were specially designed by Baldwin to accommodate mammoth molds for the industrial battery containers used in industrial trucks, electric mine locomotives, air conditioning units, and diesel-electric railroad locomotives. Stokes, a subsidiary of Electric Storage Battery Company, specializes on these boxes and is one of the nation's leading producers. The organization also does custom molding on all types of hard rubber and plastics. Baldwin Steam Platen Presses are utilized in this work.

The large presses are operated from a two-pressure accumulator system, and offer a number of modern design and construction features, including long guide bushings, for accurate register of core with mold . . . bronze lined cylinder throats . . . chevron type packing . . . and exceptional ruggedness, simplicity and dependability, which minimize maintenance.

You, too, may have some modern production problem that Baldwin presses can help you to solve. A representative will be glad to call, discuss your press needs, and recommend a Baldwin Press to meet them.



Rubber compound coming from a Banbury Mixer and passing through a mixing mill.

The Baldwin Locomotive Works, Philadelphia 42, Pa., U. S. A. Offices: Boston, Chicago, Cleveland, Houston, New York, Philadelphia, Pittsburgh, San Francisco, Seattle, St. Louis, Washington. In Canada: Baldwin Locomotive Works of Canada, Ltd., Toronto, Ontario.

BALDWIN

HYDRAULIC PRESSES

Welcome music
to consumers of Zinc Oxide

Zinc Oxide is a vitally important constituent of many products — but chiefly in rubber, paints, ceramics and floor coverings. While manufacturers in these fields may require pigments having different characteristics to meet their individual needs, uniform high quality is, and always has been, the most essential consideration.

The St. Joe Electro-Thermic method of zinc oxide production is a comparatively recent improvement of the direct-from-ore, or American Process. The flexibility of our Electro-Thermic method first of all makes it possible to produce the grades desired by the various consuming industries. The ease of control of the process furthermore ensures that the pigment in each bag possesses precisely those chemical and physical characteristics which its end-use indicates as being desirable and — most important of all—that these desirable characteristics are rigidly maintained on all succeeding shipments. *That is uniform high quality as defined by the St. Joseph Lead Company.*

uniform Quality

ST. JOE Lead-Free **ZINC OXIDE**

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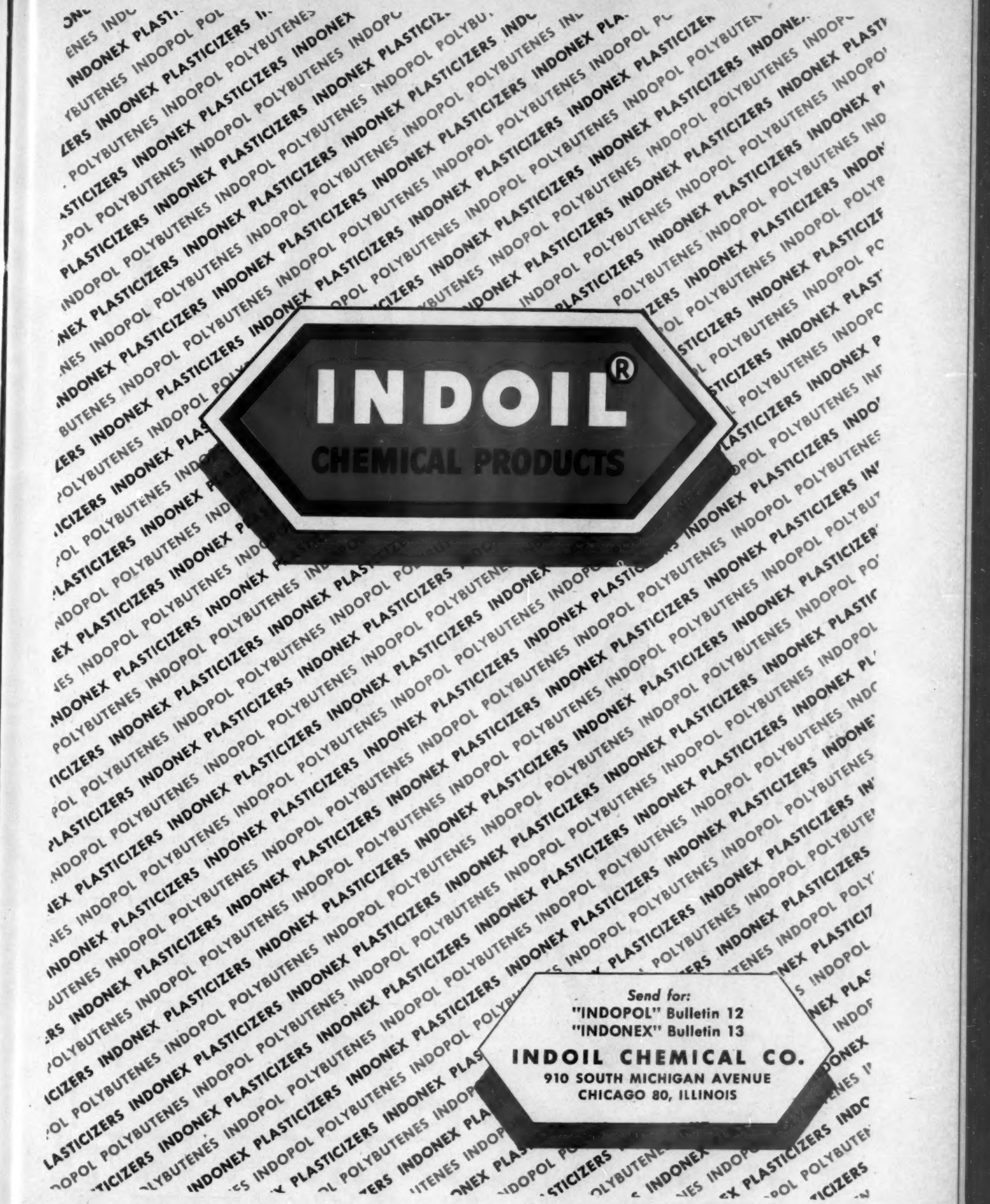
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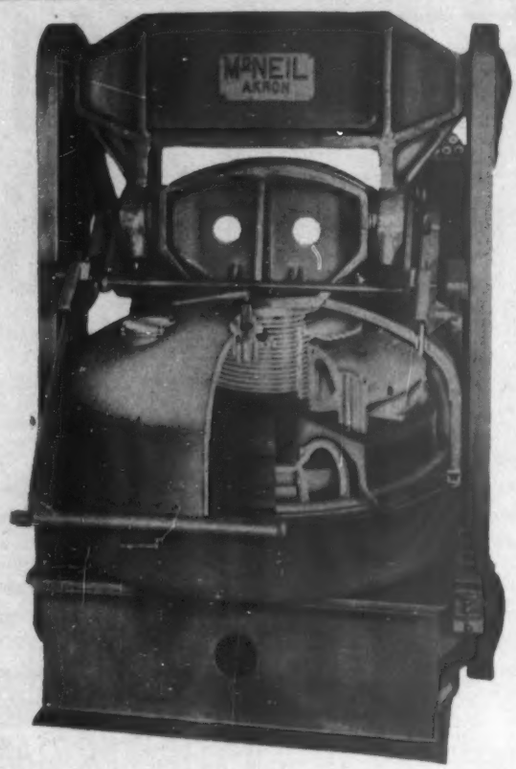

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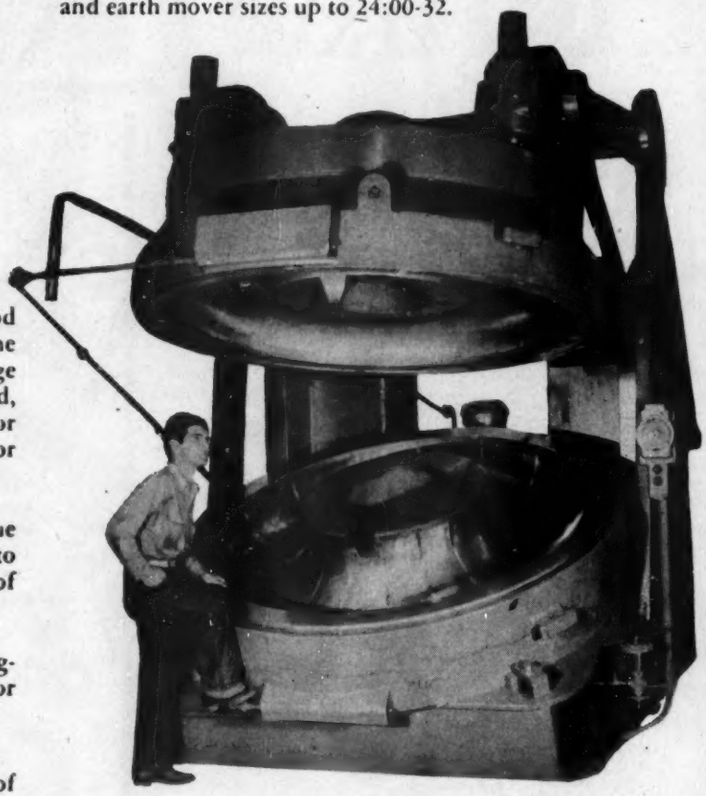

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1

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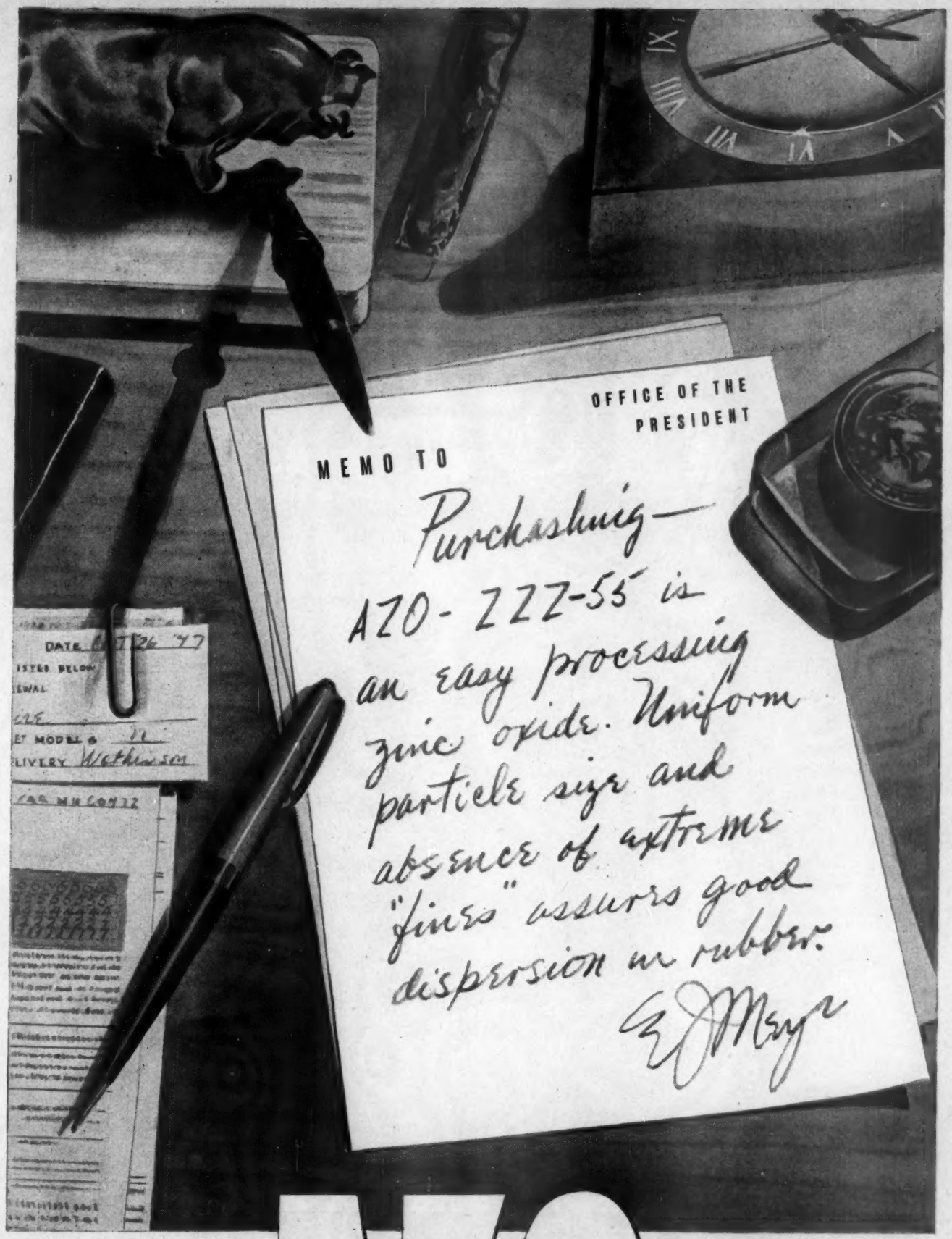

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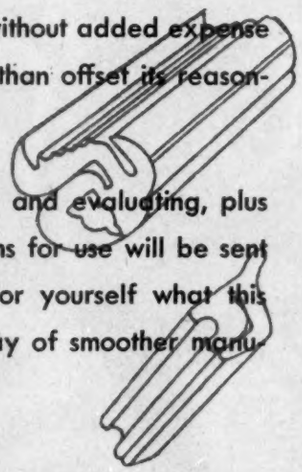

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SOLUTION: DC Mold Release Emulsion No. 35.

REMARKS: This Dow Corning Silicone release agent is the only mold lubricant that will work on this job. Gives easy release, good finish, mininum reject rate. Molds operate continuously, 6 days a week for 2 to 3 months without cleaning.

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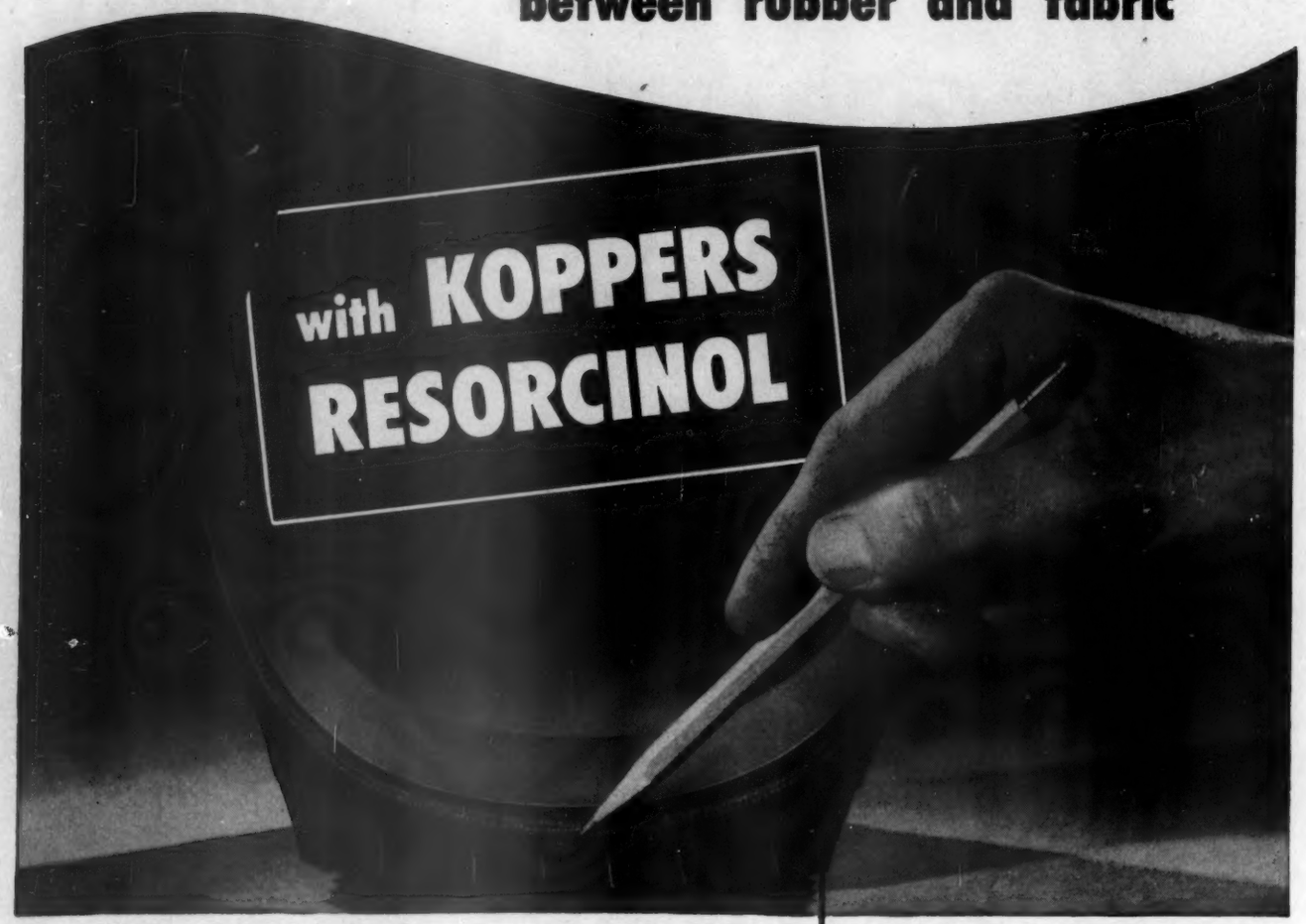
How to make a *Stronger bond* between rubber and fabric



TIRES, belting and other products which include laminations of rubber and fabric or cords are serviceable only as long as the parts hold together. To obtain best adhesion of rubber to fabric or cords, it is common practice to pre-treat the fabric in a mixture of rubber latex and some adhesive material. For this purpose adhesives prepared with Koppers Resorcinol are proving highly successful.

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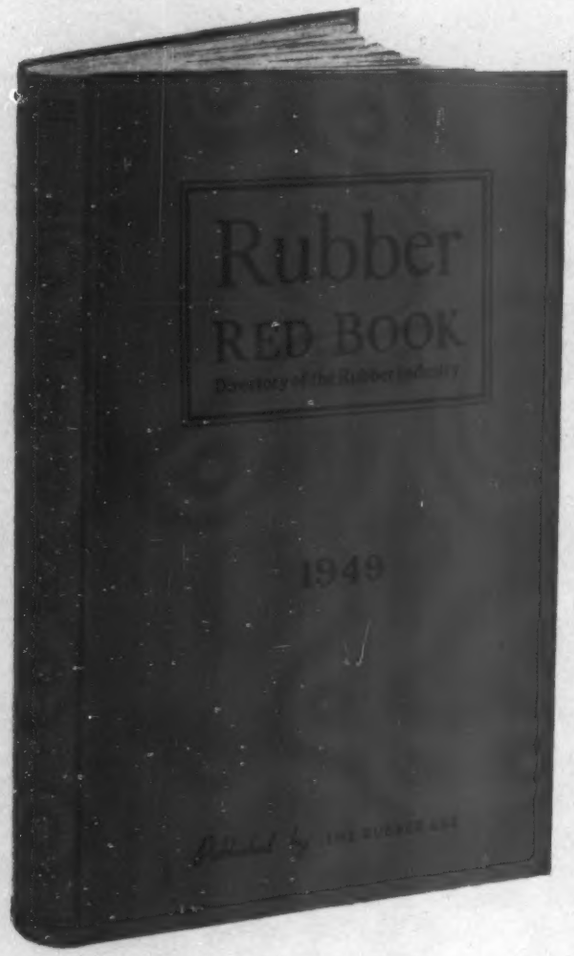
—1949 Edition



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I. RUBBER MANUFACTURERS — with personnel, products made, and a geographical breakdown of rubber plants;

II. SUPPLIERS — with complete product classifications of Machinery, Chemicals, Fabrics, Rubber (Natural, Synthetic, Reclaimed, Scrap), Latex, and other materials—with full names and addresses;

III. WHO'S WHO — a section of over 9500 names of leading people in the rubber industry, with company connections and addresses.

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RUBBER MANUFACTURERS IN U. S. (Total, 1057)
- Alphabetical Section
- Classified List of Rubber Products
- Geographical Section

RUBBER MANUFACTURERS IN CANADA (Total, 76)

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- Machinery Manufacturers and Addresses

ACCESSORIES AND FITTINGS
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- Suppliers and Addresses

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- Brand Names and Trade Designations
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- Classified by Color

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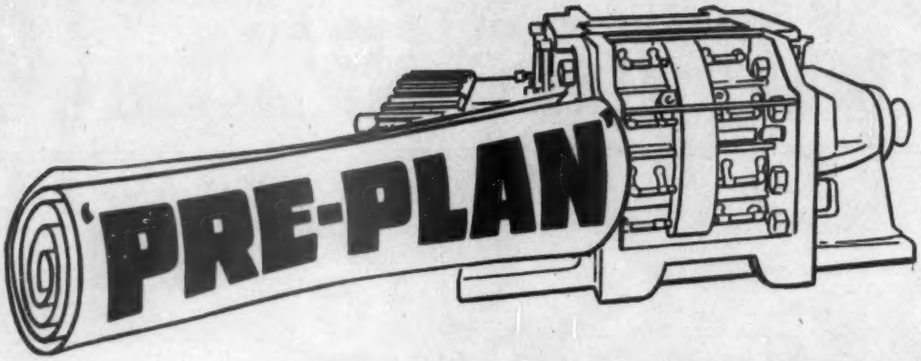

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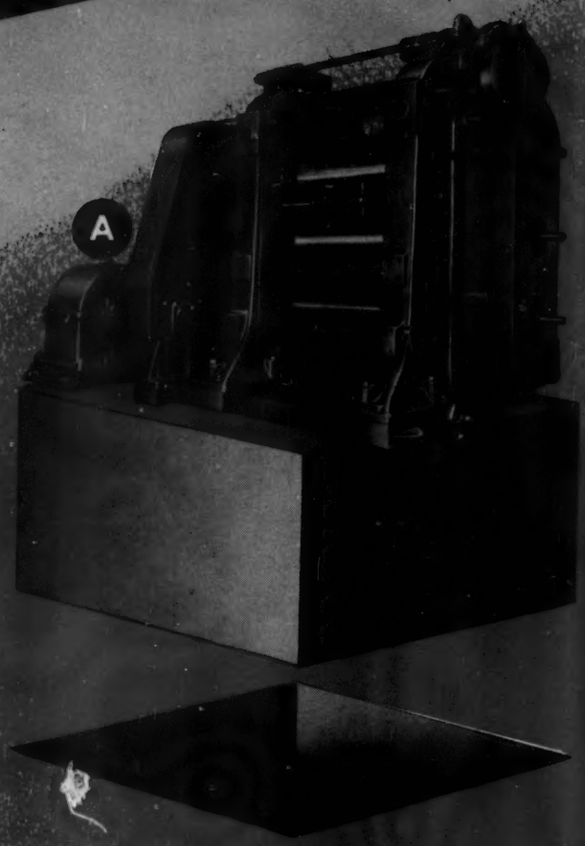

Farrel-Birmingham has maintained close contact with rubber and plastics processors since the earliest days of these two industries. The intimate knowledge gained through these relationships, combined with continuous technical research, has enabled the company to develop products which have kept pace with, or even anticipated, the changing needs of these industries.

The four calenders illustrated here are good examples of this pioneering policy. Each was designed to fill a real need—to plug a hole in processing efficiency.

Write for further information about calenders or any of the other equipment listed.

A 24" x 48" three-roll calender designed with substantial proportions and ample weight to withstand the severe service encountered in calendering stiff mechanical goods stocks. Housings, journal boxes and other parts are the same as would ordinarily be used for a 24" x 68" calender. Housings are of the arch type, of heavy box section, made of Meehanite* metal, a processed cast iron of superior physical properties.

B Designed for production that demands extremely accurate gauge and temperature control, the Farrel-Birmingham Z-type calender has a number of outstanding advantages: (1) Vertical pressure from a third roll cannot affect roll settings; (2) exposure of material in initial passes limited to a 90° arc of roll surface; (3) positive roll positioning provided by hydraulic pullbacks; (4) a built-in device which provides means for crossing the roll axes to compensate for deflection.

C In this four-roll plastics calender adjustment of the top, bottom and side rolls is by separate motor driving each screw through high ratio reduction worm gear units. Control is by push button; either end of a roll may be adjusted separately or both ends together. Opposite the bottom roll is a forged steel embossing roll equipped with air cylinders, valves and piping to provide pressure against the bottom roll.

D This 30" x 54" two-roll calender is specially designed for processing asphalt tile, with a variable speed range from 12 to 100 feet per minute, with even motion or friction between the rolls as desired. Adjustment of the top roll is motor-operated, with push-button control for adjusting either roll end independently or both together. A feature of this calender is the unit containing the drive and connecting gears, which are enclosed in a separate, fabricated steel housing. Rolls are connected to the gear stand by heavy, smooth-operating universals.

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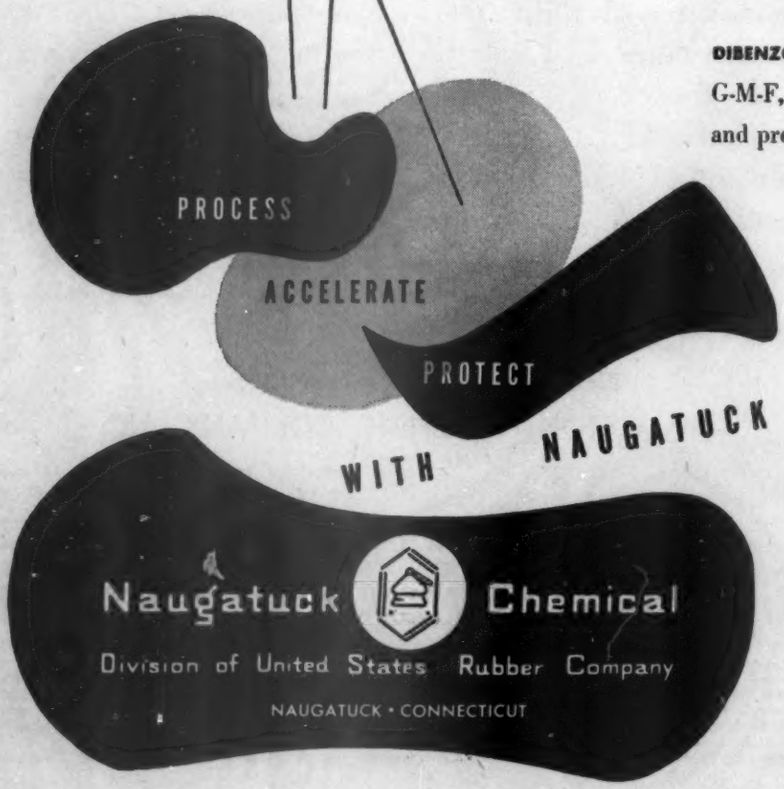

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The Carbon Black Gel Complex in Cold Rubber Reinforcement

By C. W. SWEITZER, W. C. GOODRICH, and K. A. BURGESS
Columbian Carbon Co., New York, N. Y.

EDITOR'S NOTE: Carbon Black Gel Complex, or more simply Carbon Gel, is defined as all the benzene insoluble rubber formed in unvulcanized carbon black rubber compounds. This term—Carbon Gel—is employed in place of the previously used expression, "Bound Rubber," for reasons developed in this paper.

THE classification of rubber carbons in terms of their fundamental properties of pH, surface and structure, commonly referred to as their dimensions or "building stones," has aided the rubber compounder in predicting the probable behavior of carbon blacks in rubber. The recognition of pH differences between carbon blacks and the measurement of this pH effect in 1937 *(37)* resolved much of the mystery regarding the surface chemistry of carbons and its effect on rate of cure. Electron microscope pictures of colloidal carbon in 1940 *(9)* permitted the first accurate measurement of their particle size and shape, thereby enabling rationalization of the role played in reinforcement by particle surface. Irregular deviations from correlations between particle surface and the hardness properties of rubber compounds (for example, Shore hardness and modulus) were satisfactorily explained by the introduction of the structure concept in 1942 *(10, 31, 38)*. Subsequent electron microscope pictures confirmed this concept revealing that carbons possessed different degrees of reticulate chain structure *(21)*, a large proportion of which structure persisted in the rubber compound. Concurrently, simple laboratory tests were developed which satisfactorily correlated with these dimensional properties *(32)*, thereby permitting ready evaluation of carbons in the control as well as the research laboratory.

Later, the measurement of total particle surface by nitrogen adsorption isotherms *(13, 26)* and the recognition of differences between electron microscope and nitrogen surface values led to the introduction of roughness factor *(1)* as a possible new dimension of colloidal carbons, providing a quantitative measure of the surface roughness or extension present, a property measurably affecting rate of cure when existent to any appreciable extent.

Evaluation of the probable behavior of colloidal carbons in various rubbers by these criteria seemed adequate until the development of the fully reinforcing furnace blacks (VFF, RF and HAF) and the introduction of "cold" rubber. Preliminary studies in cold rubbers consistently revealed significant differences between these carbons in the development of hardness properties that could not be adequately explained by their dimensional properties.

More specifically, the HAF carbon*, a fine furnace carbon made from oil, developed higher modulus properties than predicted on the basis of its fineness and structure dimensions. The VFF carbon†, a fine furnace carbon made from natural gas, on the other hand, was nor-

Note: This paper was presented before the Division of Rubber Chemistry, A.C.S., at Boston, Mass., May 24, 1949.
* Philblack O—see Table IV for dimensional properties.
† Statex K—see Table IV for dimensional properties.

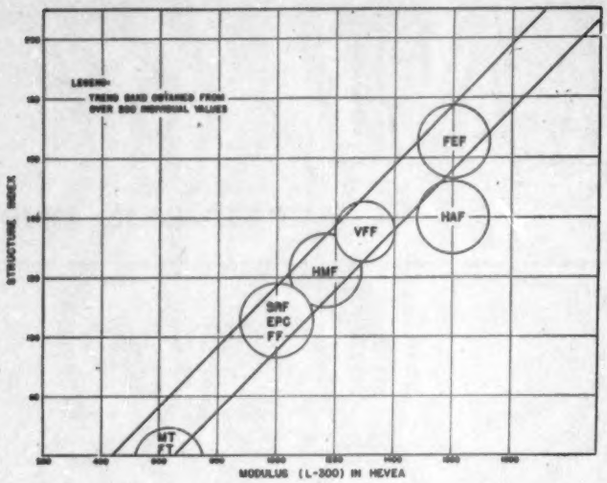

FIG. 1—Modulus in Hevea vs. structure index for rubber carbons.

mal in this respect, developing modulus properties that were in agreement with its dimensions.

These differences in modulus behavior are shown graphically in Figure 1, where the HAF carbon alone shows irregularity in modulus (L-300) in Hevea on the basis of its structure index. In cold rubber this modulus irregularity of the HAF carbon was found to be even more pronounced.

Failure to resolve this modulus difference by exhaustive tests on the carbons, which revealed in the electron microscope as well as in other dimensional tests substantial equality in fineness and structure for the VFF and HAF carbons used in the study, led to an investigation of the various factors that contribute to the development of hardness properties in rubber compounds as a possible clue to this anomaly. Chief interest centered on two factors that had been recognized as hardness builders in studies with GR-S as far back as 1944, the presence of polymer gel, and presumably any other form of gel in the rubber compound, and the effect of increased mixing temperatures in increasing the stiffness of rubber stocks.

The results of recent investigations on the effect of these two factors in cold rubber compounds with fully reinforcing furnace carbons form the subject of this paper. These investigations have led to an understanding of the role of mixing and processing temperature in the development of optimum hardness properties in cold rubber, to a recognition of significant differences in the chemical activity of the oil and gas type of fine furnace carbons in their behavior in cold rubber and, finally, to the development of a new concept, a carbon gel complex, that is presented here, tentatively, as the fundamental reinforcement structure in carbon-rubber compounds.

Polymer Gel

Early in the development of GR-S it was recognized that the presence of gel in the raw polymer contributed to the scorchiness, shortness and flex cracking of GR-S compounds, although it did enhance such hardness properties as modulus. Hence the polymers were made with little or no gel, a condition typical of the tread-type polymers today. It was also known that a gel-free polymer would develop gel from heat of processing *(35)*, which was similar in its effect to the kind of gel formed at

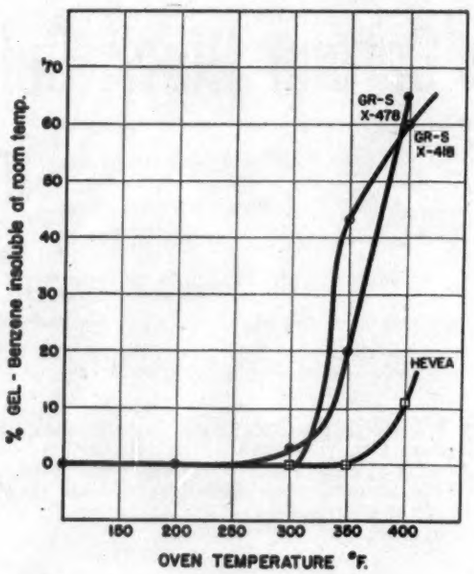

FIG. 2—Gel vs. oven heating (1 hour) for Hevea and GR-S polymers.

TABLE I—FORMATION OF GEL IN RAW POLYMERS

	% Gel Formed by Oven Heating of Raw Polymers								
	Room	250° F.		300° F.		350° F.		400° F.	
Polymer	Temp.	15′	60′	15′	60′	15′	60′	15′	60′
Hevea	0	0	0	0	0	0	0	0	10
GR-S X-418	0	0	0	0	0	4	43	43	60
GR-S X-478	0	0	0	0	4	3	20	36	70

	% Gel Formed by Mill Heating of Raw Polymers							
	for 6′		for 15′		for 20′		for 30′	
	% Gel	Temp.	% Gel	Temp.	% Gel	Temp.	% Gel	Temp.
Hevea	0	345° F.	0	395° F.	—	—	0	385° F.
GR-S X-418	0	345° F.	0	340° F.	28	365° F.	10	340° F.
GR-S X-478	0	365° F.	7	330° F.	—	—	77	480° F.
GR-S X-478	—	—	10	350° F.	—	—	—	—
GR-S X-478	—	—	28	375° F.	—	—	—	—

Notes: (1) All 0% values showed slight residue (less than 1%) that was not gel. (2) Samples of polymer for oven heating tests were sheeted once on cold mill.

the polymer plants in that it produced stiffer, scorchier and higher modulus stocks. Hence, it seemed desirable in approaching this problem to determine what role is played by polymer gel in the development of high modulus properties in cold rubber compounds containing fine furnace carbons. Throughout this paper gel is defined as the benzene insoluble fraction of the polymer as determined by standard solubility methods *(15)*.

Preliminary benzene solubility tests at room temperature, using a single screen modification of the Baker apparatus *(15)*, revealed no measurable insoluble rubber or gel in Hevea, standard GR-S X-418 or GR-S (41°F.) X-478.

Heating of these raw rubbers in the laboratory oven for periods up to 1 hour indicated that little gel developed at temperatures below 300°F. Hot Banbury milling for six minutes at temperatures in excess of 300°F. likewise showed no gel formed. Above 300°F., however, gel development was rapid, in the case of GR-S X-478 reaching a value of 70% when heated in the oven for 1 hour at 400°F.

The various results obtained are set forth in Table I with the oven heating data presented graphically in Figure 2. It is interesting to note that the gel values for standard GR-S X-418 are lower than those reported by White et al *(35)* for earlier GR-S polymers (Nos. 2 and 4) treated under essentially similar mixing conditions. These results indicate that, although cold rubber (X-478) shows more tendency to gel than the other polymers, particularly on mill heating, none of the polymers develops significant gel values below or at 300°F.

It is concluded on the basis of these tests that polymer gel, per se, probably plays only a minor role in the development of hardness properties in a rubber compound at mixing temperatures below 300°F., but may play a very significant role when mixing temperatures exceed 300°F.

A series of raw GR-S polymers* was heated in the oven for 1 hour at increasing temperatures and tested for Mooney viscosity with the results shown in Figure

* The GR-S polymers referred to throughout this paper are identified as follows:
X-418—Standard GR-S (122° F.) from Goodyear, Torrance
X-432—(Cold) GR-S (41° F.) from U. S. Rubber, Borger
X-478—(Cold) GR-S (41° F.) from Copolymer, Baton Rouge, 55 Mooney
X-481—(Cold) GR-S (41° F.) from U. S. Rubber, Borger, 60 Mooney
X-485—(Cold) GR-S (41° F.) from Copolymer, Baton Rouge, 60 Mooney

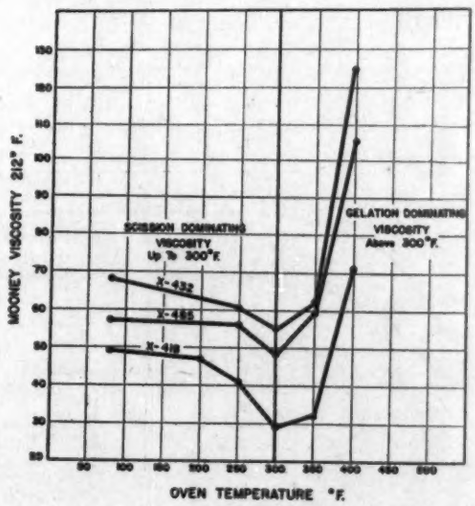

FIG. 3—Mooney viscosity vs. oven heating (1 hour) of standard and 41° F. GR-S polymers.

TABLE II—INTRINSIC VISCOSITY OF OVEN AND MILL HEATED POLYMERS

	Stock or Oven Temp.	% Gel Formed	Intrinsic Viscosity [η] in Benzene (30° C.)
Banbury Milled (15 *Min.*)			
Hevea	Control *	0	4.63
	230° F.	0	2.65
	335	0	2.53
	370	0	2.10
	395	0	2.04
GR-S X-418	Control *	0	2.12
	210° F.	0	1.89
	300	0	1.71
	330	0	1.66
	340	0	1.56
GR-S X-478 (LTP).	Control *	0	2.10
	250° F.	0	2.01
	330	7	2.08
	355	10	1.75
	375	28	1.21
Oven Heated (1 *Hour*)			
GR-S X-478	Control *	0	2.10
	200° F.	0	2.17
	250	0	2.23
	350	20	2.39

* Unmilled.

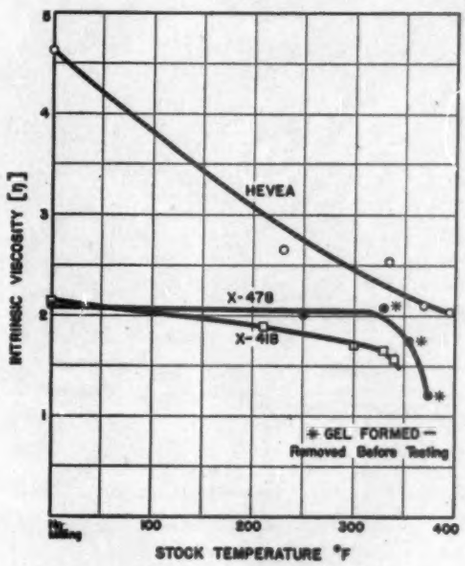

FIG. 4 — Intrinsic viscosity of Banbury milled polymers in benzene (15 minutes in midget Banbury).

3. An initial drop in viscosity up to a temperature of 300°F. is shown, apparently caused by scission, followed by a sharp increase in viscosity above 300°F. due to gelation. A similar effect for standard GR-S was observed by Juve in 1944 *(20)*. It is apparent that in the processing of such polymers, scission and gelation occur concurrently, with the relative rates of these reactions governing the final composition of the polymer. This rapid increase in Mooney viscosity for polymers heated at temperatures above 300°F. coincides with the large increase in gel content found for the same temperature range. The importance of 300°F. as a critical temperature in the heat treatment of GR-S type polymers was also recognized in studies with Buna S as early as 1938 *(19)*.

TABLE III—COMPARISON OF BOUND RUBBER METHODS

Bound Rubber Method [2]	Bound Rubber (% by Weight on Carbon) VFF Carbon [1]	HAF Carbon [1]	Percentage HAF/VFF
Soxhlet—7 days extraction	50.1	64.5	129%
Screen—3 days immersion	54.9	69.8	127%
Modified Fielding— 7 days decanting.....	52.7	68.2	129%

[1] Both carbons prepared in 50 part masterbatch in GR-S X-485, stock temperature of VFF masterbatch at 395° F. and of HAF masterbatch at 413° F. [2] Soxhlet method involves intermittent warm benzene, the Screen method and the modified Fielding method benzene at room temperature.

An indication of the molecular changes occurring in the raw polymers during these various heat treatments was obtained by intrinsic viscosity measurements on dilute benzene solutions of the soluble fractions of the treated polymers. The method employed in these tests was substantially that described by Yanko *(39)*. In all cases the bath temperature was 30 ± 0.1°C. and the concentration range was 0.05 to 0.3 grams of sol rubber per 100 c.c. benzene. Results of these measurements on some of the treated polymers described in Table I are presented in Table II and Figure 4.

The results in Figure 4 show that the milled GR-S X-418 polymer decreases slowly in intrinsic viscosity with increasing temperature without gel formation. GR-S X-478 (cold rubber), on the other hand, shows practically no change in intrinsic viscosity until gel is formed above 300°F., at which point viscosity drops rapidly as gel formation increases. This is the expected result since gel is usually credited with removal of the higher molecular weight material. Hevea shows a very rapid drop in viscosity at all temperature levels without the formation of gel. Oven or static heating, on the other hand, from the data in Table II, shows an unexpected slight increase in the viscosity of GR-S X-478 with increasing temperature, a result not in agreement with the work of Mesrobian and Tobolsky *(23)* on standard GR-S.

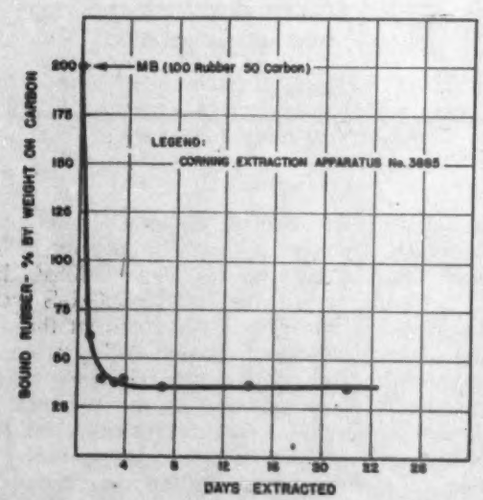

FIG. 5—Bound rubber vs. time of extraction for 50 phr VFF masterbatch in GR-S X-432.

Bound Rubber

Although gel does not form at temperatures below 300°F. in the raw polymer, insoluble rubber in association with carbon black, commonly referred to as "bound rubber," does form at the lowest mixing temperatures obtainable on the 2-roll mill (e.g., 135°F.). Since this bound rubber has the common property of insolubility with polymer gel, although "formed" at much lower temperatures, it might be expected to show some similarity to polymer gel in its development of hardness properties. The studies were therefore extended to an investigation of bound rubber.

The fact that carbon black and other fine pigments such as zinc oxide when mixed into rubber insolubilize a portion of the rubber has been known for many years. This insolubility of the rubber was associated with the adsorptive power of the carbon by Le Blanc, Kröger and Kloz *(22)* and later with a vulcanization type of mechanism by Twiss *(33)* which was disputed by Boiry *(5)*. Goodwin and Park *(18)* talked of a gel skeleton formation, Depew *(12)* associated the effect with a flocculent pigment structure, and Stamberger *(27)* believed the effect was due to another kind of cohesion between rubber molecules. Fielding *(14)* was the first to use the term "bound rubber" suggesting that it was due to adsorptive forces and hence a function of particle size. All these studies were made with Hevea rubber and, although the bound rubber effect was evaluated, its mechanism of formation and function were not clearly established.

In 1945, White et al *(35)* found the bound rubber effect in GR-S was similar in magnitude to that previously found for Hevea. More recently Baker *(2)* in discussing the behavior of microgel suggested the following as a partial explanation of the mechanism of bound rubber: "The insolubilization or binding of a few chain molecules by fillers such as carbon black creates a small structural unit whose rheological behavior may be understood by comparison to microgel. This microgel-like property of non-orientation under shearing stress is apparently important in the increased smoothness of extrusion imparted by carbon black to many rubbers."

In spite of some disagreement it would seem that the majority of these early investigations favored an adsorption force of rubber by carbon as the most acceptable explanation for the mechanism involved in the phenomenon of bound rubber. No studies on the effect of milling temperature on bound rubber were reported,

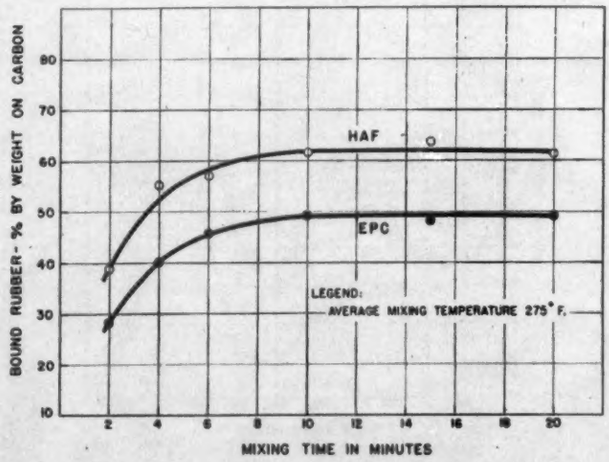

FIG. 6—Bound rubber vs. mixing time for 50 phr carbon masterbatch in GR-S X-478.

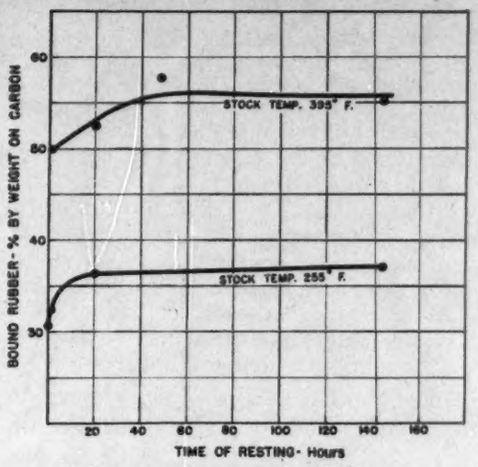

FIG. 7—Bound rubber vs. time of resting for 50 phr VFF masterbatch in GR-S X-485.

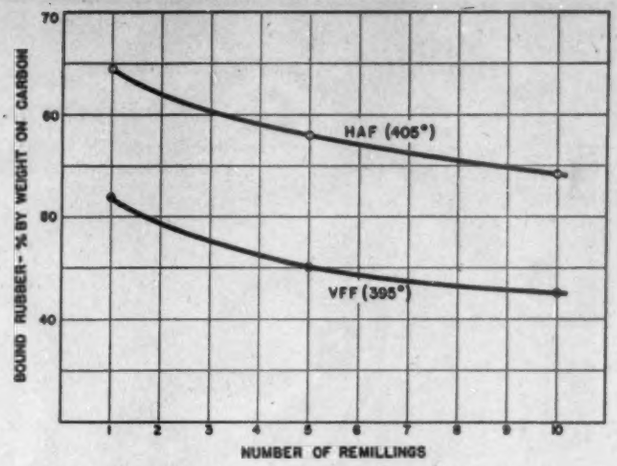

FIG. 8—Bound rubber vs. remilling for 50 phr carbon masterbatch in GR-S X-485 (premixed in midget Banbury at high temperature).

and in no case were carbons of similar dimensions shown to vary in their activity in the development of bound rubber, since it was generally accepted that bound rubber was primarily a function of particle size.

Extraction Procedure: Preliminary tests showed that the Soxhlet extraction method gave satisfactory and valid results. The results ran only slightly lower than those obtained by cold extraction methods but by a constant percentage difference (Table III), indicating a difference only in the degree but not in the kind of extraction. Undoubtedly the lower bound rubber values by the Soxhlet method are due to the refluxing and the higher temperature of the benzene in this method. In view of this agreement between the two methods all of the bound rubber results reported here were obtained by the Soxhlet method using Corning extraction apparatus No. 3885 which permitted use of a maximum of 25 thimble samples at one time.

Time of Extraction: The effect of time of extraction on bound rubber in the large Soxhlet extractor was determined by simultaneous extraction of a series of identical samples from a 50 part VFF carbon masterbatch in GR-S X-432, with samples removed at various time intervals. The results, presented graphically in Figure 5, revealed that extraction was extremely rapid in the first few hours, thereafter tapering off slowly until an asymptotic bound rubber value was reached in approximately 4 days. This would indicate that the sol rubber is readily available for extraction, and that the bound rubber, representing approximately 20% of the total rubber in the masterbatch, remains substantially insoluble with continued extraction.

Time of Mixing: Time of mixing was found to be an important factor in bound rubber tests. Results obtained with two different carbons, in 50 part midget Banbury masterbatches in GR-S X-478, using an average mixing temperature of 275°F., are presented graphically in Figure 6. Note that asymptotic bound rubber values are not obtained until mixing has proceeded for approximately 10 minutes. The shortest mixing time showed undispersed carbon present. In order to develop optimum bound rubber values it is therefore essential that the carbon be homogeneously dispersed throughout the rubber matrix.

Time of Resting: It was found that the time of resting, that is, the interval between the end of mixing and the initiation of extraction, plays an important role in the development of equilibrium bound rubber values. From the typical results presented graphically in Figure 7, it is noted that between 1 and 2 days' rest are required for the bound rubber reaction to reach substantial equilibrium, the higher the mixing temperature the longer the time required to reach this equilibrium state. Bound rubber values for rest periods short of the time required for equilibrium tend to be erratic but are invariably lower than the equilibrium value.

Some further tests have shown that this "equilibrium" value increases further with prolonged resting (3 weeks or more), due possibly to continued oxidation. Since at this equilibrium point the bound rubber values are substantially higher than initially it would seem plausible to assume that this final state is reached via a mechanism beyond adsorption forces, a mechanism involving possibly a cross-linking reaction between the "small structural units of carbon plus rubber" described by Baker *(2)*.

Remilling: Remilling of a masterbatch stock that has reached a state of substantial equilibrium, that is, has rested for at least 2 days, results in a gradual but not

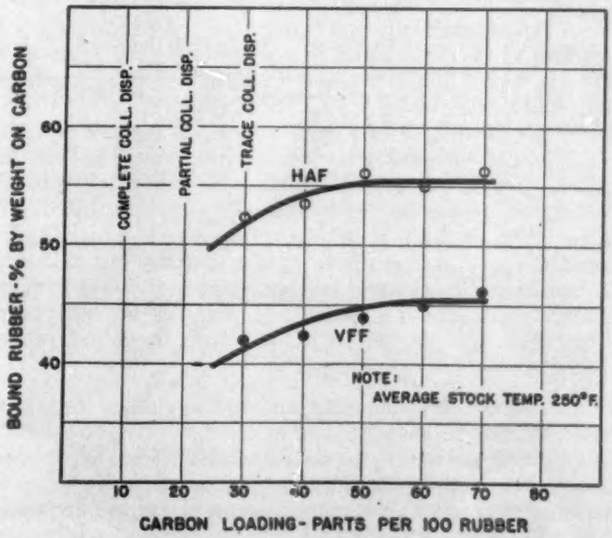

FIG. 9—Bound rubber vs. carbon loading in GR-S X-478.

TABLE IV—ADSORPTION OF GR-S X-485 AND X-478 FROM DILUTE BENZENE SOLUTION

Carbon *	Rubber Concentration (g./50 ml.)	Tumbling Time (hours)	Temp. of Benzene (° C.)	GR-S X-485 Adsorbed % from Solution	GR-S X-485 Adsorbed % on Carbon by Weight
VFF	.05	2	25	42	2.1
HAF	.05	2	25	42	2.1
EPC	.05	2	25	8	0.4
EPC †	.05	2	25	42	2.1
FF	.05	2	25	30	1.5
VFF	.09	2	25	27	2.4
HAF	.09	2	25	28	2.5
EPC	.09	2	25	6	0.5
FF	.09	2	25	19	1.7
VFF	.05	2	10	46	2.3
HAF	.05	2	10	46	2.3
VFF	.05	2	80	38	1.9
HAF	.05	2	80	40	2.0
VFF	.05	½	25	36	1.8
HAF	.05	½	25	36	1.8
				GR-S X-478 Adsorbed	
VFF	.05	2	25	42	2.1
HAF	.05	2	25	40	2.0
EPC	.05	2	25	8	0.4
FF	.05	2	25	30	1.5

* The properties of the carbons used throughout this study were as follows:

Carbon	Classification	Surface (acres/lb.) from Color	Surface (acres/lb.) from N_2 Adsorption	Structure Index
Statex K	VFF	8.6	8.9	132
Philblack O	HAF	8.6	9.0	135
Micronex W-6	EPC	10.0	11.6	105
Statex B	FF	7.0	6.8	100

† Deactivated.

drastic reduction in bound rubber values, as shown in Figure 8. Since no colloidal carbon came through the extraction thimble this result would suggest that the principal bonds in the bound rubber complex remain substantially firm but that less tightly bonded rubber is broken down to a soluble form.

Loading: Carbon loading tests revealed that complete insolubility of the bound rubber system occurs only when carbon loadings of 50% or higher are used with the fine furnace carbons. It is interesting to note from Figure 9 that at loadings above 50% the bound rubber value is substantially asymptotic. Furthermore, that as loading is decreased the dispersibility of the system increases until at the 10 part loading the whole masterbatch disperses to form a colloidal suspension.

These loading tests would indicate that the continuity of the carbon-rubber system throughout the masterbatch, which is responsible for its non-dispersability, is broken as loading is decreased, obviously not due to a variation in the carbon adsorption effects which should remain constant regardless of the loading, but rather to a break in the linkage between the individual carbon-rubber units. That this linkage involves rubber rather than carbon is suggested by the drop in bound rubber values at the lower loadings.

Summary: Summarizing, the bound rubber tests have revealed the following:

(1) Sol rubber is removed rapidly from a 50 part cold rubber masterbatch while the bound rubber remains substantially insoluble with continued extraction (Figure 5).

(2) A mixing time sufficient to produce a homogeneous dispersion of the carbon in the masterbatch (10 min. in these tests) is required to obtain optimum bound rubber values (Figure 6).

(3) A resting time of about 2 days is necessary to obtain equilibrium bound rubber values (Figure 7). This figure also revealed much greater bound rubber values for stocks mixed at higher temperatures.

(4) Remilling of the masterbatch after 2 days' resting results in a gradual reduction of bound rubber values but with no release of colloidally suspended carbon (Figure 8). This figure also revealed that HAF carbon develops higher bound rubber values than VFF carbon for substantially equal mixing temperature.

(5) At or above a carbon loading of 50 parts the bound rubber values are substantially asymptotic. At decreased loadings the bound rubber values are lower and the bound rubber complex gradually disintegrates to a colloidal suspension at the 10 part loading (Figure 9).

It is significant that bound rubber develops at temperature and time conditions well below those required to form polymer gel. Since bound rubber obviously is not polymer gel the role of adsorption was investigated.

Rubber Adsorption by Carbon

To evaluate the role played by adsorption in the development of bound rubber a series of standard adsorption tests was run, using GR-S X-485 in dilute benzene solution, five carbons and a variety of test conditions. Results are presented in Table IV.

Two significant conclusions were reached from these tests. The quantitative level of adsorption values was found to be at least 10 times lower than the average level of bound rubber values. If true surface adsorption represents such a small factor in the bound rubber values, then we must conclude that either the major portion of the bound rubber involves non-adsorbed gel rubber or that much higher molecular weight rubber or gel is formed and adsorbed during mixing.

Furthermore, from the observation that the HAF and VFF carbons gave identical adsorption values under all test conditions, indicating equal physical adsorptive activity, it is concluded that the higher bound rubber values for the HAF carbon are due not to surface adsorptivity but to the presence of more high molecular weight rubber or gel developed during mixing in the presence of this carbon. This conclusion suggests a new property of carbons, involving a gelation effect on the rubber, a property that is independent of adsorption activity.

Before leaving Table IV it is interesting to note that deactive heating of EPC black raised its rubber adsorption to the level of the fine furnace carbons.

To determine whether carbons show any selectivity in their adsorption of rubber from dilute solution, intrinsic viscosities were determined for several of the adsorption filtrates from the adsorption tests, with the

TABLE V—INTRINSIC VISCOSITY [η] OF GR-S X-478 ADSORPTION FILTRATES

Carbon	Percent Rubber Adsorbed from Solution	Intrinsic Viscosity [η] of Adsorption Filtrates *
None (control)	0	2.03
EPC	8	2.05
VFF	42	2.22
HAF	42	2.40

* Benzene solutions at 30° C.

results set forth in Table V. The results reveal that carbons tend to adsorb selectively the lower molecular weight material from dilute solution, the greater the total adsorption from the solution the larger the increase in the viscosity of the filtrate.

Similar intrinsic viscosity tests on the extracts from the bound rubber tests revealed, however, that in a concentrated non-solvent mix such as a dry masterbatch, the picture is reversed. In such mixtures, as indicated by the viscosity results presented in Table VI, the carbons selectively adsorb or remove the higher molecular weight material. Adsorption of this higher molecular weight material suggests that in a masterbatch mix, as distinct from a dilute benzene solution, the mechanism involved in the development of the bound rubber complex is different from the physical adsorption involved in dilute solution tests.

Adsorption of rubber from dilute solutions by carbon black has been studied by other investigators, including Le Blanc, Kröger and Kloz *(22)*, Carson and Sebrell *(8)*, Blow *(4)*, Stamberger *(27)*, Goldfinger *(17)*, Barnett and Jones *(3)* and Baker *(2)*, for the purpose of assessing adsorption behavior in terms of other rubber and carbon properties. The bulk of these investigations indicated that from dilute solution carbon black selectively adsorbs the lower molecular weight material, in agreement with the results reported above.

Bound Rubber vs. Carbon Black Gel Complex

From the preceding studies the following conclusions may be drawn:

(1) Mill heating of the raw polymer does not develop significant amounts of gel below 300°F.

(2) Mill heating of a carbon masterbatch at temperatures much lower than 300°F. develops significant amounts of insoluble rubber, referred to as bound rubber. As shown by Figure 7, at higher mill temperatures (395°F. vs. 255°F.) the bound rubber increases by approximately 50% (55% vs. 37% rubber by weight on carbon).

(3) A tight bond between carbon and rubber in the bound rubber complex is indicated by the time of extraction results. A progressive development of the bound rubber complex after mixing is shown by the time of resting results suggesting chemical reaction rather than physical adsorption. The remilling studies indicate gradations in the tightness of bonding in this bound rubber complex. The loading studies suggest that the linkage in the complex involves rubber rather than carbon.

(4) The adsorption studies reveal that in physical adsorption from dilute solution carbons adsorb less than one-tenth the rubber insolubilized via bound rubber.

(5) The intrinsic viscosity studies show that physical adsorption removes from the polymer a different fraction than is removed by bound rubber. The fraction removed by bound rubber would seem to be similar to that removed in the formation of polymer gel.

Combining these observations the conclusion is reached that "bound rubber" strictly is neither adsorbed rubber nor gel rubber but rather a complex system, which involves something more than carbon-rubber attraction as defined by adsorption forces but which in its behavior resembles polymer gel. This system may then be pictured as a three-dimensional lattice structure with carbon-rubber units joined together by additional rubber through primary and/or secondary valence forces.

This complex system, because of its indicated variability in dimensions and stability due to such factors as temperature, loading, resting, and type of carbon present, and because of its similarity in behavior to polymer gel, it is now preferred to designate by the new and more descriptive name of carbon black gel complex or more simply as carbon gel. This carbon gel complex, associated with the carbon black, comprises the adsorbed rubber, and whatever insoluble or gel rubber is formed through the agency of the carbon or temperature, the whole building an irregular but nonetheless continuous insoluble lattice structure throughout the matrix. Since this carbon gel is similar in many ways to polymer gel, factors influencing polymer gel formation, particularly temperature, should also be effective in altering the composition of this carbon gel complex.

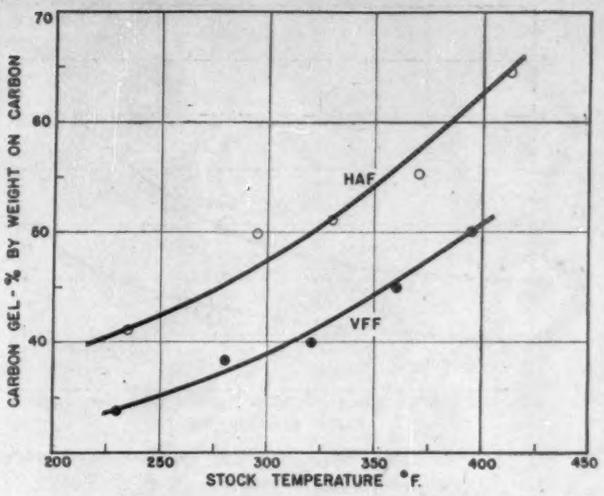

FIG. 10—Carbon gel vs. stock temperature for 50 phr carbon masterbatch in GR-S X-485.

Effect of Mixing Temperature on Carbon Gel Development

The suggestion from the preceding studies that this carbon gel complex may be the governing factor in the development of hardness properties in cold rubber compounds, and the indication that the development of carbon gel is profoundly influenced by mixing temperature, led to an exhaustive investigation of the effect of mixing temperature on carbon gel development and other properties of cold rubber masterbatch mixes in the presence of the fine furnace carbons (VFF and HAF). Since the standard GR-S and the GR-S 41°F. polymers reacted similarly in these studies the results given here

TABLE VI—INTRINSIC VISCOSITY [η] OF BOUND RUBBER EXTRACTS FROM 50 PHR CARBON MASTERBATCHES IN GR-S X-432.

	Intrinsic Viscosity [η]*
Polymer X-432	
Sheeted only	2.16
Milled 6′ at 215° F.	2.02
Milled 6′ at 370° F.	2.12
Extracts from M.B. Mixed at 375° F.	
VFF	1.56
HAF	1.48
EPC	1.43

* Benzene solutions at 30° C.

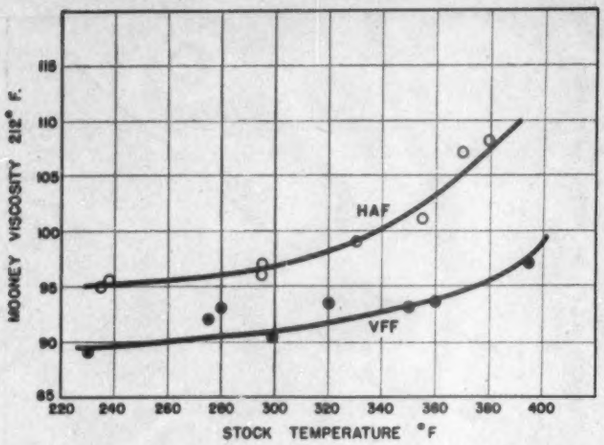

FIG. 11—Mooney viscosity vs. stock temperature for 50 phr carbon masterbatch in GR-S X-485.

are limited to one typical cold rubber polymer, GR-S X-485.

The results obtained with GR-S X-485, presented graphically in Figure 10, reveal that with both the HAF and VFF masterbatches the carbon gel value increases with increasing stock temperature, but at a slightly faster rate and at a higher level in the case of the HAF carbon. This increase in carbon gel value with higher mixing temperature, amounting to approximately 50% in going from 225°F. to 400°F., would seem to be associated not with adsorption effects but with additional gel rubber forming and becoming associated with the carbon gel complex, already present at the lowest mixing temperature. This additional gel rubber does not form suddenly at temperatures in excess of 300°F., as in the case of the raw polymer, indicating that in the presence of carbon the gelation reaction is more controllable as mixing temperature is increased.

The initial higher carbon gel level for the HAF carbon cannot be due to a greater adsorption of rubber, since its adsorptivity was found equal to that for VFF carbon in dilute benzene solution, so it must be ascribed to a greater specific chemical activity in gel formation.

If the masterbatch carbon gel level is indicative of the level of hardness properties developed in the final compound than it is obvious that the VFF carbon masterbatch can be given the same carbon gel level developed with the HAF carbon masterbatch, by the simple expedient of mixing at higher temperature (by 50°F. to 100°F. depending on the polymer used). From another approach, if, for example, a 50% carbon gel level represents the upper safety limit in processing without scorch trouble, then it is apparent that 325°F. would be the upper safe processing temperature for HAF carbon whereas for VFF carbon this safe processing temperature would approach 400°F.

The conclusion to be reached is that the VFF carbon is less active than the HAF carbon in this gel-forming property and merely requires a boost in temperature to make it equally effective in this respect. Hence, carbons are indicated as possessing a hitherto unrecognized property, their ability to form gel as carbon gel, an activity which is also a function of temperature of processing.

The effect of mixing temperature on the Mooney viscosity of cold rubber masterbatch stocks was found to follow the same pattern developed in the carbon gel studies. The results in Figure 11 for GR-S X-485 masterbatch stocks are typical. It is observed that Mooney viscosity increases with stock temperature, substantially linearly for VFF carbon at all temperatures but at a faster rate for HAF carbon at temperatures above 325°F. This increase in Mooney is another indication of the greater carbon gel formation with higher processing temperatures. If stiffness of the masterbatch stock is a measure of the hardness properties developed in the final compound, then it is apparent that either the HAF or VFF carbon masterbatch can be given any required stiffness level simply by adjusting mixing temperature.

The accelerated increase in Mooney viscosity for the HAF masterbatch at temperatures above 325°F. suggests that in this temperature range carbon gel formation is approaching the so-called scorch level and that processing at higher temperature is fraught with danger. VFF carbon, on the other hand, would appear to give safe processing in cold rubber masterbatch stocks at temperatures up to 400°F. Since in these masterbatch mixes all other stiffness factors, such as structure, fineness and degree of dispersion of the carbons, were substantially equal, the Mooney increases with temperature must be ascribed to increased carbon gel.

It was pointed out earlier that the carbon gel reaction continues from the time mixing is stopped to a period some two days later when a state of equilibrium is reached. It was also pointed out that at reduced carbon loadings the carbon gel structure becomes discontinuous and that benzene solutions of such masterbatch stocks will show colloidally suspended carbon.

In an attempt to evaluate the state of the carbon gel complex before equilibrium is reached benzene dispersion tests were run on samples of the 50 part masterbatch mixes referred to in Figures 10 and 11. In these tests pellet samples were cut from the masterbatch stock within a few seconds after milling and immediately dropped into a test tube of benzene. The mixture was shaken for 2 hours to insure optimum dispersion. The presence of colloidally suspended carbon in the solvent would indicate discontinuity in the carbon gel system, the heavier the suspension the greater this discontinuity. The degree of this colloidal suspension in benzene was evaluated by a relative rating method, from very good, indicating complete dispersion of the masterbatch, to poor or none, indicating little or no disaggregation of the masterbatch. Results obtained with GR-S X-485 over a range of mixing temperatures are presented in Figure 12.

The results in Figure 12 reveal that with both carbons the suspension rating decreases with increased mixing temperature, slowly throughout in the case of VFF carbon, rapidly in the case of HAF carbon in the tempera-

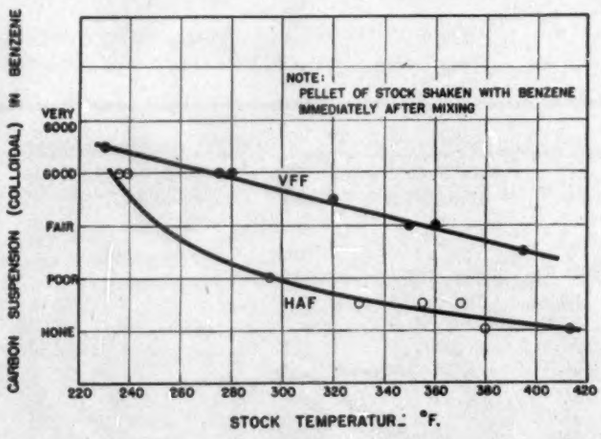

FIG 12—Carbon suspension vs. stock temperature for 50 phr carbon masterbatch in GR-S X-485.

ure range below 300°F. This suggests that in the case of VFF carbon, at the lowest mixing temperature (220° to 240°F.), the carbon gel complex is discontinuous immediately after mixing, this discontinuity becoming gradually less as temperature is increased. In the case of HAF carbon the results indicate that at a temperature around 300°F. the carbon gel complex becomes substantially continuous on the mill. Hence, a significant difference between carbons in the rate as well as the amount of carbon gel formation during mixing is indicated.

Dilute solution viscosities, shown graphically in Figure 13, indicate that a similar molecular fraction of the rubber is removed by increased mixing temperature as is removed by the carbon gel at lower temperatures and by polymer gel at any temperature. The carbon gel and Mooney viscosity values for these GR-S X-432 masterbatch stocks are not included but they showed the same trends presented in Figures 10 and 11.

This effect of mixing temperature in increasing the hardness properties of cold rubber compounds, via the development of increased carbon gel, differs from the so-called scorch methods described by Gerke *(16)* and in B.P. 493,552 *(6)*. In these scorch methods with Hevea rubber, obtained on the mill and in the oven respectively, the length of heating time as well as the temperature was high, indicating that the carbon gel probably developed to an extreme degree which, however, was substantially milled out. Hence, the final cured stocks probably contained comminuted carbon gel dispersed in a low pigmented rubber phase.

The method described in this report suggests the most desirable condition as one just short of this extreme state, controlled by limiting mixing time (and temperature in the case of very reactive carbons), the carbon gel complex then remaining substantially continuous in the final vulcanized state. This approach is somewhat similar to the method described by Crawford and Tiger *(11)* who combined heat treatment at 380°F. of carbon black GR-S stocks with cross-linking agents and found that processability was improved, modulus was increased, tensile was lowered drastically and the stock was shortened. Without cross-linking agents processability did not improve and tensile was lowered only moderately but the modulus increase remained.

Activity Factor of Carbons in Carbon Gel Formation

Since carbons of equal dimensions (pH, surface and

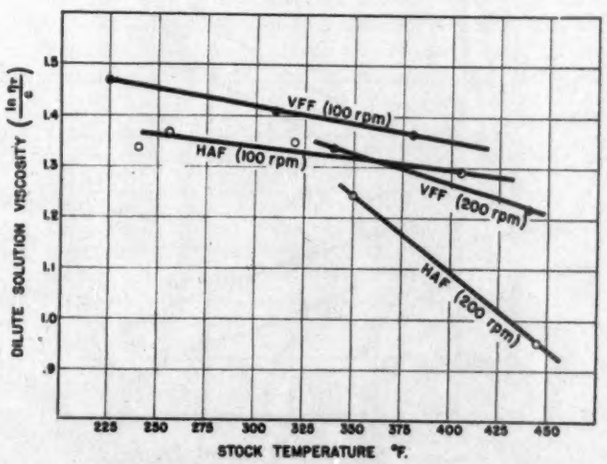

FIG. 13—Dilute solution viscosity vs. stock temperature for soluble fraction from 50 phr carbon masterbatch in GR-S X-432.

TABLE VII—OXYGEN ADSORPTION BY FINE FURNACE CARBONS

Carbon	Oxidation Conditions Temp.° F.	Time	% Volatile *
VFF	control		0.89
	350	72 hours	1.42
	450	17 hours	1.60
	750	15 min.	1.45
	750	30 min.	2.61
	750	60 min.	4.28
HAF	control		1.23
	350	72 hours	2.50
	450	17 hours	2.57
	750	15 min.	2.27
	750	30 min.	3.75
	750	60 min.	6.22

* Determined in standard test by heating in covered crucible for 7' at 1750° F.

structure, see Table IV) show such widely different behavior in their carbon gel forming effects, it is apparent that another factor must be present on the surface of these carbons, a factor indicated as chemical in nature but not defined by pH. Oxygen plays an important role in rubber reactions and the possibility that oxygen might be associated with this activity factor was investigated.

Staudinger *(28)* emphasized that an extremely small amount of oxygen slowly insolubilizes rubber, with the process reversed when oxidation is prolonged. Whitby *(36)* indicated that if oxygen was responsible for this effect the amount involved must be very small. The work of Stevens *(29)*, Naunton *(24)*, Mesrobian and Tobolsky *(23)*, and Shelton and Winn *(25)* substantially confirmed these earlier investigations leading to the inescapable conclusion that small amounts of oxygen promote gelation of the rubber while large amounts favor scission. The initial drop of Mooney viscosity followed by a rise on heating GR-S was observed by Juve *(20)* in 1944 and attributed to oxidative breaking predominating in the early stages and an "oxygen vulcanization" predominating in the latter stages. Vila *(34)* ascribed this change in Mooney viscosity to the combined effect of scission and cross-linking.

In preliminary studies with dry VFF and HAF carbons it was found that on heating these blacks in an air oven and determining the oxygen adsorption or pick-up by measuring the volatile increase, the HAF carbon showed 50% greater oxygen pick-up than VFF carbon. The detailed results of these tests are given in Table VII.

If HAF is more active in picking up oxygen in the dry state is it possible that this effect is carried into the cured rubber tread stock? In order to check this effect tread stock samples were treated in the oxygen bomb and weight increases determined with the typical results shown in Table VIII and graphed in Figure 14. The results invariably showed a higher rate of weight increase for the HAF stocks by a percentage factor approximately equal to that found in the dry black tests (Table VII). On the basis of these tests it would appear that this difference in activity factor of these fine furnace carbons in promoting the development of carbon gel is associated in some manner with oxygen.

Applications in Cold Rubber Tread Compounds

Appreciating the significance of mixing temperature in the development of carbon gel, and realizing that the hardness properties of different fine furnace carbons in

TABLE VIII—OXYGEN PICK-UP OF CURED TREAD COMPOUNDS WITH VFF AND HAF CARBONS

Polymer	Mixing Conditions	Days in Oxygen Bomb [1]	% Weight Increase for HAF Compound	% Weight Increase for VFF Compound
Hevea	2-roll mill—130° F. start	2	.39	.29
	remilled on 200° F. rolls	3	.75	.47
GR-S X-481 [2]	Laboratory Banbury	1	.25	.14
	Laboratory Banbury	2	.41	.26
	Laboratory Banbury	4	.62	.44
GR-S X-485	plus antioxidant on	2	.31	.20
	200° F. 2-roll mill	4	.39	.24
GR-S X-485	Lab. Banbury—jacket temp. 80° F.	1	.14	.14
	Lab. Banbury—jacket temp. 80° F.	2	.26	.20
	Lab. Banbury—jacket temp. 80° F.	4	.47	.39
	Lab. Banbury—jacket temp. 200° F.	1	.26	.14
	Lab. Banbury—jacket temp. 200° F.	2	.39	.22
	Lab. Banbury—jacket temp. 200° F.	4	.59	.41
	Lab. Banbury—jacket temp. 250° F.	1	.28	.18
	Lab. Banbury—jacket temp. 250° F.	2	.43	.30
	Lab. Banbury—jacket temp. 250° F.	4	.64	.46
	Lab. Banbury—jacket temp. 265° F.	1	.26	.15
	Lab. Banbury—jacket temp. 265° F.	2	.43	.28
	Lab. Banbury—jacket temp. 265° F.	4	.61	.46

[1] In every instance Bierer-Davis bomb used at 158° F., 300 psi. [2] GR-S X-481 data graphed in Figure 4.

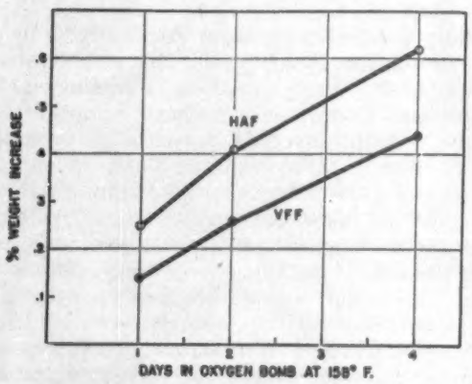

FIG. 14—Oxygen pick-up of cold rubber treads in Bierer-Davis bomb.

cold rubber compounds could be equated by the judicious application of mixing temperature suited to each black, laboratory compounding tests were carried out with identical compounds using GR-S X-481 with the typical results presented in Figure 15. The following compound was used:

GR-S X-481	100.0
Carbon	50.0
Zinc Oxide	3.5
BLE	0.25
Paraflux	4.0
Circosol 2XH	4.0
Santocure	1.125
Sulfur	2.000
Stearic Acid	2.000

It will be noted from the graphs in Figure 15 that the modulus of VFF carbon can be brought to the level of the HAF carbon by raising the mixing temperature approximately 50°F. At this temperature elongation of the VFF stock has decreased but not quite to the level of the HAF stock. The significance of this effect of mixing temperature in equating modulus properties is important. Carbons with a high activity in carbon gel formation must be mixed in cold rubber at reduced temperatures to avoid scorch troubles, whereas carbons with a normal activity in carbon gel formation can be mixed at higher temperatures, under normal high speed conditions such as are common with standard GR-S. Carbons without this excessive activity are therefore safer in processing and are likely to retain an elongation advantage when equated in modulus to the more active blacks.

Application of these principles to factory processing by Braendle et al *(7)* and Steffen *(30)* has resulted in the development of cold rubber tires with VFF carbon

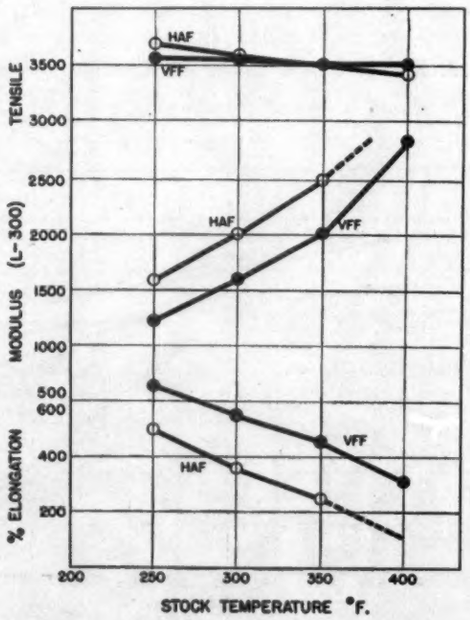

FIG. 15—Stress properties vs. mixing temperature of VFF and HAF in GR-S X-481 (40' at 292° F.).

that give equal or slightly better road wear than shown by the HAF carbon. Their results shown in Table IX revealed that equating the hardness properties of HAF and VFF carbon stocks resulted in equating the tire wear performance. In this instance equating the modulus was accomplished by two steps, in column 2 by adjustment of softener to give equal processability and in column 3 by the use of a slightly higher mixing temperature to give equal modulus. Comparing columns 1 and 3 it is noted that for equal modulus the VFF carbon shows a better tensile, an advantage in elongation, a superiority in laboratory abrasion, equal rebound, superior aging properties and a 5% advantage in road wear. Undoubtedly with equal softener content, as used in the laboratory tests, equality in modulus of these factory compounds could be obtained by increasing the mixing temperature differential.

These laboratory and factory tests on cold rubber tread compounds indicate that road wear of cold rubber tires, for carbons of equal dimensions, depends primarily on the development of hardness properties, which are influenced by the development of carbon gel. The formation of carbon gel, in turn, is promoted by mixing temperature and an activity factor on the carbon possibly involving oxygen. Hence the formation of carbon gel in the masterbatch, at least for cold rubber, would seem to be desirable for good wear performance of the final tread compound.

TABLE IX—FACTORY PROCESSED TIRES

	HAF	VFF	VFF
Softener	12	8	8
Stock Temperature, °F.	350	350	375
Green Physicals			
L-300	1650	1560	1650
Tensile	3475	3650	3650
% Elongation	535	565	550
Lab. Abrasion	100	105	113
% Rebound	60	57	59
Oxygen Aged			
L-300	1890	1820	1800
Tensile	2950	3100	3175
% Elongation	485	510	505
Road Tests			
Wear Rating at 26,300 Miles	100	100	105 *

* 40% of the non-skid remained at this mileage.

Summary

The carbon structure concept still holds as the primary factor in the development of hardness properties in cold rubber but a secondary factor supplementing structure has been added, a factor now called carbon gel.

This carbon gel complex assumes significance as possibly basic for reinforcement, a carbon-rubber complex which sets the pattern for the ultimate form and performance of the vulcanized stock.

Although particle size, as well as structure of colloidal carbons, are factors in the development of carbon gel, a new property of carbons is indicated, a surface activity that is independent of pH, an activity that influences the rate of carbon gel development. The magnitude of this activity is indicated by the behavior of the carbon toward oxygen.

Mixing temperature has been found to be a vital factor in the development of carbon gel. Considered in conjunction with carbon surface activity this means that a specific mixing time and temperature are required for the optimum carbon gel development with any carbon. Carbons with excessive activity in carbon gel formation (e. g., HAF) will require reduced mixing temperatures to avoid scorch dangers; carbons with a normal activity (e.g., VFF) reach an adequate carbon gel level for full reinforcement at normal high speed mixing conditions.

These observations are of practical significance to the rubber compounder. If beset with scorch problems in the use of an excessively active carbon he may substitute a less active carbon with its more controllable gel-forming activity, which will permit handling with no revision of mill room technique as practiced with standard GR-S, that is, with high-speed Banbury and temperatures allowed to reach their natural levels. The dividend here is increased output, no added provision for holding down temperature, and more freedom from processing troubles.

With either type of carbon used at its optimum mixing temperature, identical reinforcement in terms of tensile and modulus is obtained, with the less active carbon however maintaining at equal modulus, hardness and road wear an advantage in elongation that promotes improved resistance to flex cracking and aging.

ACKNOWLEDGMENT

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Some Additional Reports of Avoidable Accidents

THE Rubber Section of the National Safety Council is continuing its campaign to reduce accidents in rubber manufacturing plants by pointing out some avoidable accidents in its Rubber Safety News Letter. Data on some recent accidents follow:

Unsafe Guard: A millwright crew installed a guard on a calender wind-up. In making up the guard they left a sharp, raw edge of metal facing the hand wheel controlling the wind-up. When the calender was put into operation, the crew was called to crimp the edge and recalled twice during the two days that the calender operated. All operators were cautioned about the unsafe condition of the guard, but one man working in haste forgot about the dangerous condition and cut himself across the back of the left hand, severing a tendon. The raw edge was crimped and made safe during the shift following this serious injury.

This injury would have been prevented by closer supervision in the millwright department to ascertain that the job was properly completed before it was left or by closer inspection in the operating department before the completed job was accepted.

Bad Housekeeping: A man was pushing an empty factory truck into a highway trailer to unload pigment when he slipped on loose pigment on the floor of the trailer and injured his back. The immediate cause of this injury was failure to clean up the trailer bed before men walked on it. In addition, it would have been much better practice to get help because the truck he was pushing was unduly heavy for one man even on good footing.

Wind-Up Accident: A woman attempted to start a roll of fabric into the apron of a wind-up with one hand while pressing the starter button with the other hand. Her hand was caught in a wrinkle of the fabric and her hand and arm were twisted around the shell, producing a severe shoulder injury. Since this type of wind-up is particularly difficult to start by hand, it has been equipped with a motor starter requiring continuous pressure on the starting button to keep the machine operating.

Unguarded Conveyor: While operating a refiner a man absent-mindedly pushed his hand down into the chute carrying the refined stock away. Apparently he gave no real thought to what he was doing until his fingers were caught. He received a fracture and laceration of the second finger of his left hand. In this type of work it is not difficult to install a coarse mesh guard, which will not admit hands, over the conveyor feed opening.

Short Circuit: A tire builder was knocked down by an electric shock when he used his ply knife to push the 220-volt switch button of his stock servicer. He suffered shock and a seriously burned right index finger. In addition, a violent flash occurred which ignited the gas in the safety can on the machine. The flash screen in the can prevented the fire from spreading.

Other tire building machines in the plant showed evidence of workers using knives to push switch buttons. This is a very unsafe practice. The knife digs into the Bakelite push button, in time strikes the metal contact, and a short circuit results.

Power Truck: An employee who was learning to operate a power truck became confused when he was about to run into a building column and forgot which foot operated the brake. He raised his left leg to protect himself from the column and got his leg caught between the column and the truck. He suffered extensive fractures of the leg and was thrown clear of the truck by the sudden stop.

To prevent recurrence of this type of accident, the truck platform has been equipped with a substantial rail on each side to keep the operator within the protection of the truck frame.

Hand Knife Injuries: Every month brings in a considerable number of reports of injuries by knife cuts. A surprisingly high proportion of these result from cutting towards some part of the body with a hand knife. A few examples are: a man who cut his left wrist while trimming mold flash off mechanical goods; a man who cut his right thumb while cutting to length rubber tubing going by him on a conveyor; a man who cut completely off the roll and drove the knife into his leg below the knee while cutting rubber on a mill; and a man who attempted to carry a piece of rubber away from the mill on the point of his knife and stabbed himself in the nose.

All these actions are violations of the rule about cutting away from yourself with a knife which we all learned when we were Boy Scouts.

Improper Clothing: A man milling a Bakelite mixture on a roll mill had his glove caught in the mixture. In attempting to pull away, he twisted and severely injured his right wrist.

This case illustrates two general principles of safe handling of material on mill rolls: Use of gloves should be avoided unless the material is absolutely too hot to handle with the bare hands. If gloves must be used, then they should be a type which is loose and open at the wrists so that it will be possible to get out of them readily if they are caught.

The Growing Role of Glycerine in the Rubber Industry

By MILTON A. LESSER

Glycerine Producers' Association, New York 18, N. Y.

PEOPLE who are familiar with the properties of glycerine know how readily this substance adapts itself to new applications. Technologists in the rubber industry are well aware of the potentialities of this clear, heavy fluid. Hence, as in the past, glycerine has continued to expand its usefulness in the rubber industry, not only in connection with improved rubber products, but also in association with newer rubber applications.

In checking over the more recent applications, it is evident that many of glycerine's properties are being called into use. In a number of cases its plasticizing and softening effects are utilized. In other instances, its value as a lubricant is being greatly expanded. Other developments have put emphasis on its value as a heat- and pressure-transmitting medium. Of course, the fact that glycerine is an important chemical substance is reflected in the growing use of the alkyd resins by the rubber industry. Glycerine is a major raw material in the production of these synthetic resins.

Application as a Preservative

The status which glycerine has attained in processes and materials for preventing rubber deterioration is well indicated in Reinsmith's comprehensive survey on the aging and preservation of vulcanized rubber *(1)*. He points out that the use of glycerine alone or admixed with other materials, is frequently mentioned as a preservative. Some 14 examples, taken from the technical and patent literature, are cited to illustrate such glycerine applications. For instance, it has been suggested that mixtures of aniline or similar amines and glycerine be used to extend the useful life of tires and hose, that a mixture of glycerine and drying oil be employed to preserve the surfaces of air bags, and that a coating of corn syrup and glycerine be used to preserve rubber.

In another example taken from the older literature Reinsmith cites Graichen's recommendation that thin rubber articles be stored by immersing them in an aqueous solution of glycerine and borax. By this procedure the rubber is said to retain its strength and elasticity, and secondary vulcanization is prevented. Also discussed is Braunswarth's method for treating rubber goods that have been stored for long periods of time, presumably under adverse conditions. In this method, rubber goods that had been stored for three years were carefully kneaded and stretched, after which 5 per cent ammonia and 5 per cent glycerine were successively applied at 40°C. It is quite significant that a modification of this rubber-restoring procedure is given in the latest (1948) volume of the "Chemical Formulary" *(2)*.

Although it would hardly seem necessary in view of glycerine's beneficial actions, the newer technical literature provides additional evidence that glycerine, in its many applications, does not cause rubber deterioration. This has been found to hold true, not only for natural rubber, but also for some forms of synthetic rubber. Such data are given in studies *(3)* to determine the value of Butyl (GR-I- rubber in the chemical processing field. As part of these investigations, comparisons were made between natural and Butyl rubber with respect to the effect of a variety of fluids, such as solvents, alcohols, fats, various kinds of oils, and certain chemicals. When tested with glycerine, the highest rating was obtained, indicating that both natural and synthetic rubber are excellent for service in contact with this fluid.

Such information, added to that gathered over years of practical experience, helps to explain why glycerine is so widely and satisfactorily used in lubricants for rubber surfaces, whether in actual use or in molding processes. When it is used as a mold lubricant, rubber articles are not only easily removed from the molds, but the glycerine also helps the goods to retain a desirable gloss. Such effects help to explain the inclusion of glycerine in the following rubber lubricant *(2)*:

Glycerine	40 cc.
Diglycol stearate	80 Gm.
Water	400 cc.

Enough ammonia is added to the above to yield a neutral solution.

The value of glycerine was recently indicated in Schulze's *(4)* report on the rubber forming of light metals. Rubber-pad forming, he notes, is ideal for aluminum and magnesium when quantity is limited and parts are shallow. Moreover, die costs are a fraction of those for other methods, and design changes are quickly and inexpensively made during production. In discussing "bead" formation, he points out that the addition of a lubricant provides the effect of an infinitely smooth block and permits the formation of deeper beads. Glycerine is a good lubricant for this purpose because it is easily applied and removed, is not objectionable to the operator, and does not harm the rubber.

Schulze also remarks that although glycerine is mentioned in connection with locked-in beads, it can be used to advantage on a great many rubber-pad forming operations. In fact, glycerine can be used wherever greater elongation is required than can be obtained without lubrication. He stresses, however, that although the lubricant can be applied and removed easily and is not messy to handle, it should be used only when necessary.

Useful as Hardening Medium

Because of its ability to transfer heat and pressure, glycerine has long served as an efficient vulcanizing or hardening medium for rubber and latex. Several years ago, Ryan *(5)* utilized these properties in a continuous process for making latex filaments or threads. Using a modification of this process, Ryan *(6)* has more recently

devised a method whereby glycerine serves to form and harden a latex coating on a single or stranded metallic wire.

The latex solution is carried in heated glycerine and both liquids are charged at such pressures as to move at the same rate of speed. A wire is introduced into the center of the viscously flowing stream of latex in glycerine. The wire also moves at the same rate as the liquids, the speeds being so related as to bring about streamline or viscous flow. In cross-section this arrangement consists of a central wire core with a coating of latex (which is extruded from a nozzle), the two being surrounded by a viscous stream of glycerine.

The heated glycerine serves not only to harden the latex, but also to support and confine the latex to a definite size and shape by acting as a lubricating, mobile and confining wall. When the latex coating solidifies through the action of the heated glycerine, the filament is withdrawn from the confining glycerine in the form of a coated wire. The apparatus and method devised by Ryan are said to have a wide range of application.

Glycerine and certain of its resinous derivatives are finding new uses in the production of bonds and adhesives for natural and synthetic rubbers. Thus, according to Rafter's *(7)* process, natural or synthetic rubber vulcanizates can be bonded to magnesium and its alloys by rubber cements based upon rubber derivatives, such as chlorinated or cyclized rubber. In order for these cements to work effectively, the surface of the metal must first be treated with a polyhydric alcohol acidified with concentrated sulfuric acid. Glycerine is one of the polyhydric alcohols listed as being suitable for the purpose. In addition certain glycerine derivatives may be employed, including polyglycerols, glycerol monochlorohydrin, or glycerol monomethyl ether.

In another case *(8)*, strong self-adhesion is imparted to a neoprene adhesive film by the addition of a vulcanized oil-resin mixture. To prepare this mixture, equal parts of refined linseed oil and a glycerine ester of hydrogenated rosin are heated for three hours at from 290 to 300°C. The temperature is then reduced to 150°, 10 per cent of sulfur is added, and the heating continued for another three hours. Finally, 20 parts of this oil-resin mixture is milled into 80 parts of neoprene (Type GN) and the whole is dissolved in toluene. The solution leaves a non-tacky film on cloth, but two pieces of the coated material are firmly bonded when pressed together.

Alkyd resins also enter this phase of utility. In the method developed by Fuller *(9)*, improved adhesion of vulcanized polyester synthetic rubbers to metal bases is obtained by means of an intermediate layer of an alkyd resin composition. This layer, which imparts increased bond strength, is obtained by baking on the metal a coating of a drying oil-modified glyceryl phthalate resin. Of related interest is the use of glyceryl phthalate alkyd resin as a plasticizer for rubber in the production of self-healing containers and tanks. This glycerine-containing resin also imparts strength to the rubber when it comes in contact with hydrocarbons (e.g., gasoline) *(10)*.

As in the past, glycerine continues to prove its worth in processes for reclaiming rubber and in methods for making rubber substitutes. An example of the former is given in a European process *(11)*. In this method, macerated scrap rubber is heated to over 150°C. at above atmospheric pressure in a hermetically sealed vessel. A quantity of thiophenol equivalent to about one-fifth of the rubber mass is present. The combined physical and chemical effects restore the rubber to its prevulcanized condition. Glycerine is one of the materials specified as suitable for removing the thiophenol from the reclaimed rubber.

Another patented process *(12)*, which has been assigned to the United States Government as represented by the Secretary of Agriculture, describes the use of glycerine in the formation of thermosetting polymers. These compounds are described as being useful as bonding agents and as substitutes for rubber at high temperatures. They are formed by the reaction between a 1-pimaric acid-maleic anhydride adduct and glycerine. This results in a gel which upon further heating rapidly polymerizes to the infusible state. This glyceryl ester of 1-pimaric acid-maleic anhydride adduct is very hard at room temperature and is insoluble in water, acetone, ethyl alcohol, chloroform or methyl alcohol. On prolonged standing in acetone, benzene or chloroform, the material swells but does not go into solution.

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Rem Board Cutting Block

Increased thickness and a newly-developed plastic compound make for longer life in the Rem Board Cutting Block introduced by the Remington Products Co., 1505 Copley Road, Akron, Ohio. One inch thick, a ¼-inch increase over the former thickness, the improved block provides a tough resilient surface for mallet cut-

ting, hand cutting, and die cutting on "clicking" machines. Elasticity of the material minimizes need for planing and dressing, and field tests conducted by the manufacturer have demonstrated 50% longer life. The board is available in standard and special sizes required by manufacturers of rubber, plastic, leather, fiber and light metal parts.

Developing a Calendergraph

The Application of Modern Quality Control to the Calendering Process

By ANTHONY OLADKO

Production Superintendent, Johnson & Johnson, New Brunswick, N. J.

IN THE majority of calender-using industries today, calendering is still considered an art. As pointed out by Mr. E. S. Thompson of Farrel-Birmingham*, manufacturers are very secretive about their processes and do not release operating data on calenders. This has hindered the design and operating knowledge of calenders in general. The following excerpts from Mr. Thompson's paper give a very good estimate of the calender situation:

"We are continuously faced with the logical request to offer the very latest in machine design from the standpoints of quality, flexibility, and economical production costs. At the same time, however, and virtually in the same breath, we are requested to present proof of the satisfactory performance of the contemplated specifications for the new equipment.

The continued excessive demands of labor, combined with increased recognition of the variability of the human element, which have occurred at a time when consumer resistance to higher prices and variations in quality are also on the increase, have necessitated immediate process economies and improvements, even at the cost of high obsolescence. We therefore find ourselves in a position where for one reason or another practically all industrial plants are faced with the necessity of process improvements which, in most cases, involve modifications to, and replacement of, existing machinery.

On the assumption that most of the problems leading to joint supplier-consumer responsibility for new designs can be worked out, there is still in many instances another major obstacle. Some industries (possibly the floor covering trade is the most outstanding) have long made secrecy one of their first lines of defense against competition. Such a policy has the effect of retarding development.

Calenders, together with some extrusion units, are used most frequently to form and "meter out" the finished product. In view of this critical function it is perhaps more important that the design of calenders be held to closer tolerances than in the design of any of the machines previously discussed. *Variations of a few thousandths of an inch or ounces per yard, when applied to the tremendous volumes of stock processed on calenders, can well mean the difference between profit and loss for a manufacturing operation.*

Gage control must be classified into the two major types: variations across the sheet or over the face of the roll, and variations along the length of the material being calendered. The former type is a function of roll shape and design and is therefore subject to the variations mentioned under the topic of roll proportions which result from "compromise crowning." The only solution appears to be the use of larger units having stiffer rolls and less variation in usage of the calender, or the use of the crossed axis feature in some cases. Variations in gage along the length of the material being calendered are usually caused by fluctuating operating conditions, such as changes in temperature, speed, bank size, formula of stock, guide setting, and others. Needless to say, all of these conditions should be maintained as constant as possible.

One of the major factors retarding roll adjustment development has been the lack of satisfactory continuous gaging devices, particularly where no contact with the calendered material is permissible."—End of excerpts.

The techniques of modern quality control have made it possible to apply the progress of science to both the calendering equipment and the products made by calenders. This paper will show how process capability studies can overcome manufacturers' secretiveness in spite of themselves, and how most of the perplexing problems posed by Mr. Thompson can be answered.

"Preserving the Order"

One of the basic concepts of statistical quality control is known as "preserving the order." This is applied to maintaining the order of a batch of material through the various production processes, *and particularly to maintaining and accumulating inspection data on pieces produced consecutively.* Although this technique has been applied rather extensively to intermittent types of production, it has not been adopted too widely for continuous types of production. If one can visualize a continuous stream of production such as material coming out of a calender, it is not difficult to convert to intermittent production by merely attaching a device at the end of the calender train which would cut off the material

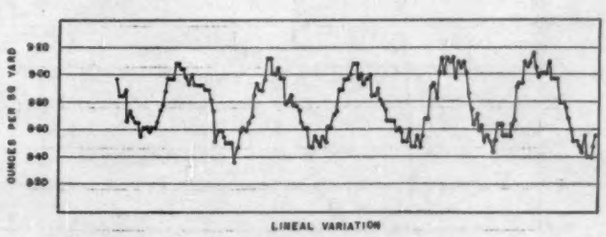


FIG. 1—Detailed study of a rubber calender.

* "Recent Developments in Rubber and Plastics Machinery," paper presented before the Philadelphia Rubber Group, April 16, 1948, by Mr. Thompson, and published in *I.R.W.*, May, 1948.

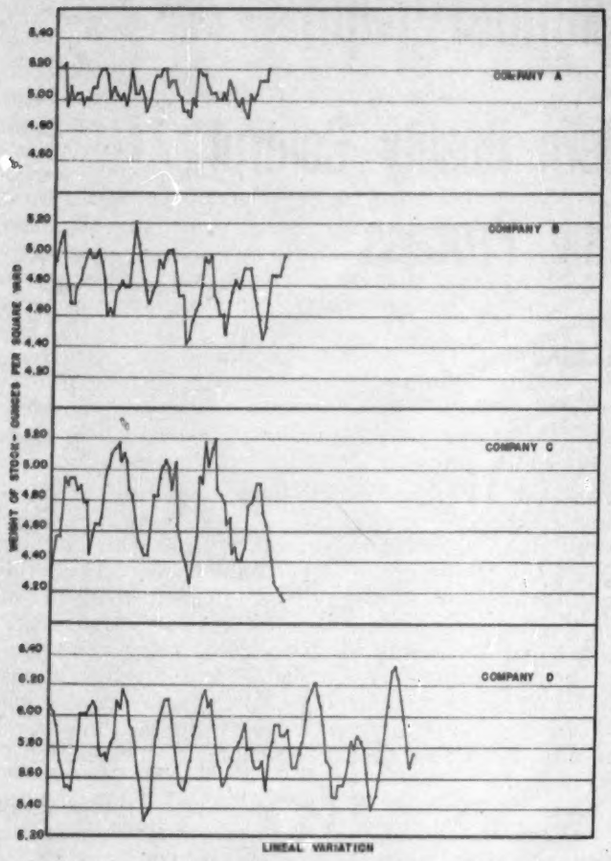


FIG. 2—Graphs on four different calenders, each from a different company producing adhesive tape.

every few inches. Instead of having a continuous roll of material, one would have a truck full of small pieces of material.

As soon as it can be established in one's mind that continuous production is just a stream of joined finite pieces, the techniques applied to the study of intermittent production can be used. Dr. J. M. Juran†, a leading authority on quality control, likes to emphasize that measurement of the pieces as produced will always *"tell* on the process." How true this statement is can be shown dramatically by a study of calendered materials.

Figure 1 is presented as an example of the details which can be brought out concerning a calender. One is immediately struck by the apparent cyclical variation, a variation which is the "heartbeat" of the process because of its regularity. The cycle can be attributed to only one factor due to the nature of the process, and that is the eccentricity of the calender rolls. By calculating the lineal distance each cycle repeats itself, it is possible to check this against the circumference of the calender rolls. If the two metering calender rolls have a friction ratio, data from a test such as Figure 1 can indicate the friction ratio, which in turn can be checked by counting the teeth on the gears.

The minor variations within each cycle are due to gear chatter and errors in the test procedure. In the case of Figure 1, it is reasonable to assume that the process can hold the over-all variation in weight of stock metered to approximately 0.7 ounce per square yard.

An important aspect of this particular process capability study is that once having established a technique

† Dr. Juran is Professor and Head of Administrative Engineering Department at New York University, and is the author of "Management of Inspection and Quality Control."

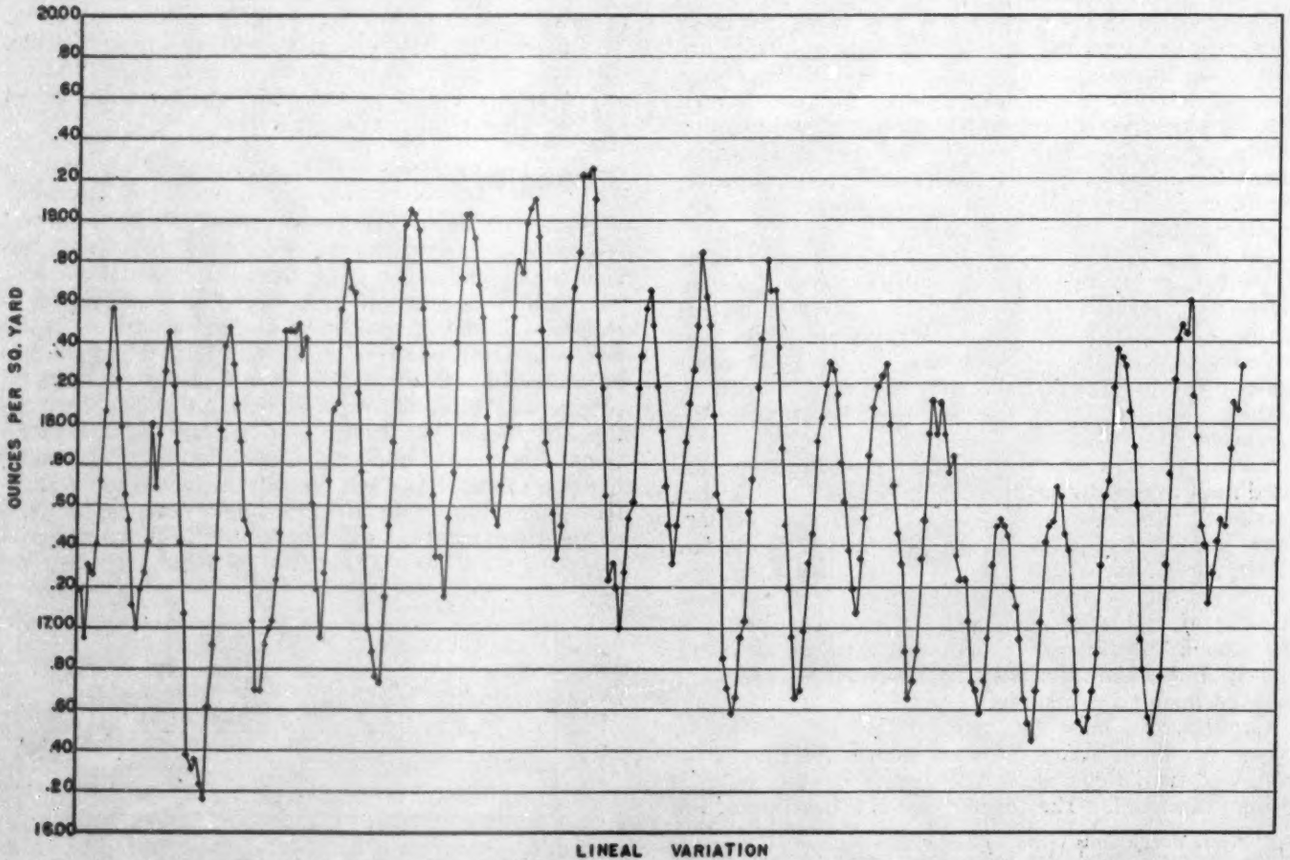


FIG. 3—Variations in calendered non-friction rubber stock produced on a new calender.

for "seeing" a calender process, the same technique can be applied to materials produced by calenders in any part of the country. Due to the continuous nature of the products produced by calenders, this technique opens up a means of comparing calenders within the same company and between different companies.

An illustration of this is shown by Figure 2 which is a comparison of four different calenders in four different companies producing pressure-sensitive adhesive tapes. It can readily be seen that Company A is producing the most uniform product, and on longer samples the degree of control for each calender could be determined. Assuming all of the companies had the same minimum specification, Company A could drop its average weight of stock spread much lower than any of the other companies due to the range of the cycles. This would mean a more uniform product at lower cost by using less stock. Please note that all of these calenders show the inherent "heartbeat" or cyclical variation of the process.

To analyze the performance of a newly built and installed calender in a rubber company, a sample of non-frictioned rubber stock was obtained. The need for more precision in the rubber industry in general as regards weight and gage of calendered stock is typified by this example in Figure 3. The inherent cyclical variation is very clear, and indicates that the overall variation is approximately 1.70 ounces per square yard. Due to the thickness and non-tackiness of this stock (it was spread at approximately 18 thousandths), it was possible to have all the samples hand gaged. When a graph was prepared, it was almost a duplicate copy of Figure 3.

It is probably true that because of the heavier stocks spread in the rubber industry, precision is not thought to be as important as in the plastics industry. Furthermore, using Figure 3 as an example, a total variation of 1.70 ounces per square yard when shooting for an average of 18 ounces per square yard is approximately a 10% variation. A factor which is often overlooked, however, is that since the variation is basically due to the eccentricity of the calender rolls a total range of 1.70 ounces

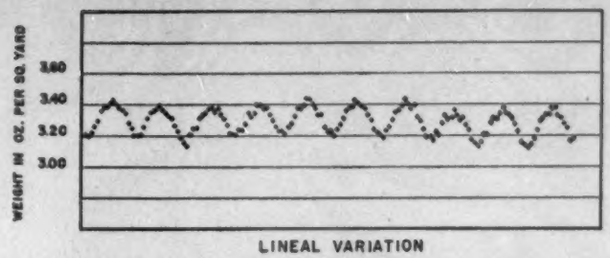


FIG. 4—Variations in calendered stock of polyvinyl chloride plastic from an old, but well maintained calender.

per square yard would exist when spreading stock at 5 ounces per square yard—or a variation of 34%. Even though in certain applications of rubber stock uniformity of gage is not too important, the possibility of decreasing costs should be appealing. It is evident that with a narrower dispersion, the average weight or gage can be brought much closer to the lowest acceptable specification limit, thereby using less stock to obtain the same result.

Determination of Optimum Results

Another important aspect of an investigation of this type is the determination of the optimum results which can be obtained from a calendering process. In other words, within sound economic and design considerations, how narrow a range in variation of stock calendered can be obtained? Using the control technique, investigations can be made on materials such as plastic films where the control of gage of stock is presumably much more critical. The plastics industry, because of the nature of its products, has done more towards developing precision calenders than any other calender-using industry.

Samples of polyvinyl chloride film were obtained from two of the country's largest producers. Figure 4 shows

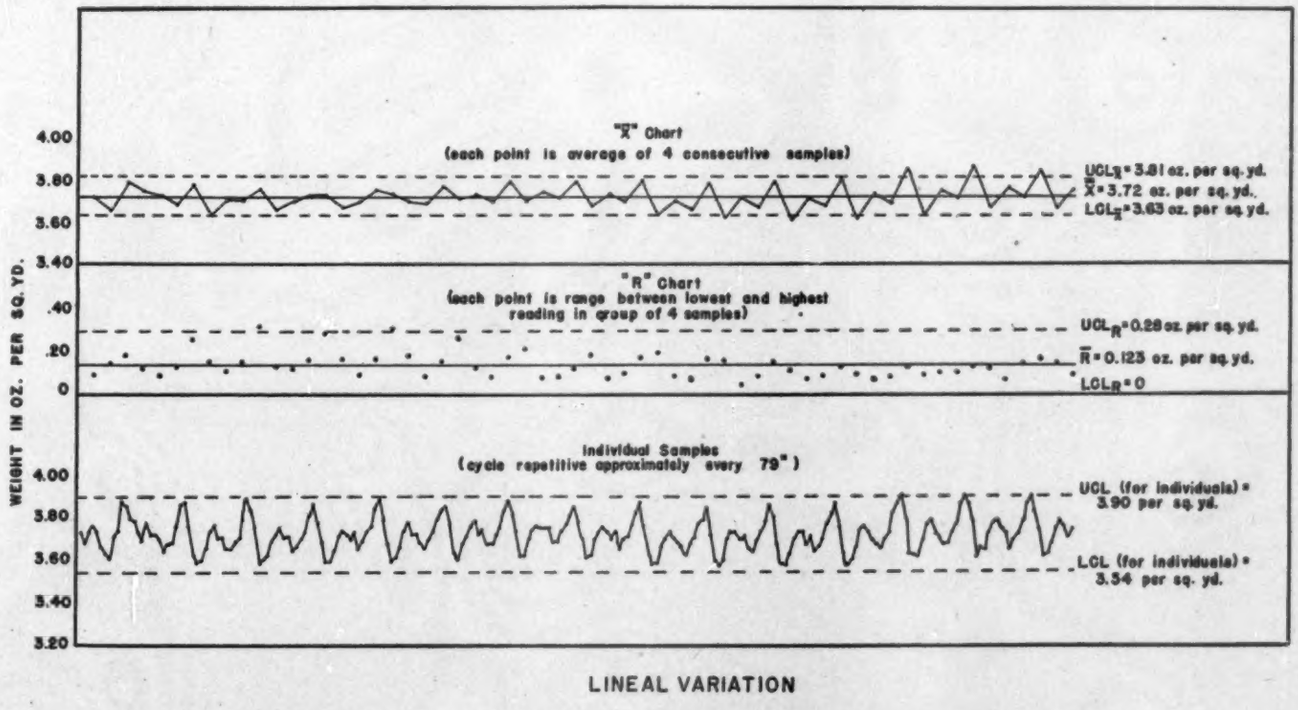


FIG. 5—Determination of variations in calendered stock—polyvinyl chloride plastic.

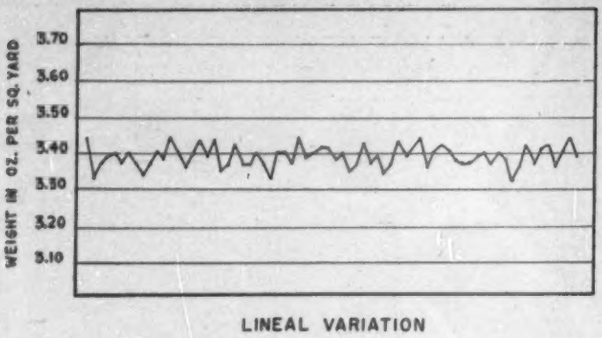


FIG. 6—Variations in .004" polyvinyl chloride plastic.

a profile of a sample of .004" plastic film. The cyclical variation is amazingly uniform and the range seems to be within .24 ounce per square yard. The indications on this sample were so good that a larger sample of the same manufacturer's material was obtained. Although the film was still .004", it was of a different code number and presumably came off of a different calender. Figure 5 shows that a different calender indeed had been used. Although not necessary for comparative information, a statistical study was made on this run. Several important points can be made from Figure 5, as follows:

1. The graph on individual samples shows the presence of two amazingly uniform out-of-phase cycles, probably due to variations injected by each one of the two metering rolls of the calender. Certainly this shows where action should be taken to narrow down the range even further.

2. The control limits on the graph for individual samples indicate that over 99% of the production can be kept within an overall range of .36 ounce variation per square yard. This is approximately equal to an overall range of 10% on the nominal gage, .004".

3. The $\overline{R}$ and $\overline{X}$ charts show a good degree of statistical control, and a running control chart could very easily be kept on this calender.

A sample of .004" stock from a second company producing polyvinyl chloride film was tested and the results are shown in Figure 6. This material was known to have been produced on a new roller-bearing calender. The uniformity is so good that it almost conceals the cyclical variation, and it was necessary to increase the scale on the graph in order to show the variation more clearly. If a cycle is not very clear, (in this case subsequent tests did pick it up), it can be determined very easily if the calender roll diameters are known.

Please note that the overall variation is well within .12 ounce per square yard. This is roughly one-third of the variation shown in Figure 5 for another vinyl film. If a test were run on larger samples of the material used in Figure 6, the degree of statistical control could be compared with that shown in Figure 5. In any event, it is mechanically possible to produce stock on a calender with an overall variation of approximately 4% in the finished product. Based on the findings in Figure 5, it is possible to maintain continuous uniformity and statistical control on calendered materials.

It may be interesting to point out in this connection that the Timken Roller Bearing Company has run full page advertisements in the rubber trade journals making the following statements: "With the calender rolls mounted on Timken Balanced Proportion Tapered Roller Bearings, the Dominion-built calenders at the plant of Canadian Resins and Chemicals, Ltd., roll Vinylite plastics film 48" wide by .004" thick, holding to a tolerance of plus or minus 10% on thickness throughout the length and width. That's a tough test for any calender."

An overall variation of 20% on .004" stock is equivalent to .8 thousandths or roughly .8 ounce per square yard variation. That may be a tough test in the rubber industry, but is far from precise in the plastics industry. The results in Figure 6 show that it is possible to hold to a tolerance of plus or minus 2%. It is entirely feasible that a *process capability* study on the Canadian calender would show a more favorable picture than plus or minus 10%.

The above discussion brings up another factor—variation across the width. In the studies made by the author, the same techniques were used for width and lengthwise variation. In general, it was found that fair control could be obtained on calender rolls up to 60", but that it seemed to be more difficult to obtain "across the width" control in rolls over 60" in width. This is undoubtedly due to the mechanical difficulties in crowning rolls, boring or casting the cores of the rolls, obtaining uniform temperature distribution throughout the rolls, stresses and deflections involved in wide rolls, quality of metal used, and many other reasons. A realization of these conditions should lead to better calender design.

Summary

In summary, it might be well to list the following factors:

1. Due to the nature of calenders, it is extremely difficult to *precisely measure* such factors as crown, eccentricity, distortion, etc. Measurement of the product, which can be done much more accurately, will indicate exactly what the calender is producing.

2. Process capability studies invariably show what is happening *within* a process. This technique of modern quality control measures the finished product which, after all, is the prime concern of producer and consumer. It not only lays bare the results of a process, but indicates the action to be taken to improve the results.

3. Opinions based on opinions go out the window. A process capability study always presents indisputable and reproducible facts. The age-old arguments which exist amongst production, inspection, engineering, and laboratory personnel are quickly dissipated when facts are laid on the table. The development of a team spirit as a result of having facts available can in itself justify process capability studies.

4. For equipment such as calenders, the area for basic design development can be indicated by process capability studies. The relative merits of rolls having machined or cast rolls, the effect of grinding and/or honing rolls, the degree of gear chatter with cut or cast gears, the relative merits of various bearings, and many other factors can be determined from a scientific analysis of the process.

5. Development of a "calendergraph" which can be used on each calender places the "live" information and control at the point where it can do the most good. After thousands of yards have been processed out-of-control it is too late to make an adjustment. The time for adjusting is during the processing and as frequently as the need is indicated by a control chart. For all too many years calender operators have not had any accurate means of controlling their processes. They have had the *mechanical controls*, but not an accurate means of knowing when and how much to use them. A calendergraph provides them with a "navigation chart" with which to guide their processes.

6. For processes such as calendering a means is provided for not only checking different calenders within a company, but for accurately comparing performance with that of competitors. This, of course, helps stimulate competition which in turn will deliver a higher quality and probably less expensive product to the consumer.

7. A control chart with a sampling plan is more accurate than any mechanical gaging device yet developed for a calender. Paradoxically, for the calendering process, the continuous gaging device can act as a ruler while the control chart is the micrometer.

8. Although it is true that fluctuating operating conditions have an effect upon the variation in weight of stock, these can all be controlled (speed, temperature, formula, etc.). *The variation due to the eccentricity of the calender rolls, however, is fixed and cannot be measured accurately except by a process capability study.* It should also be pointed out that a process capability study can be used to accurately measure the effect of variations in operating conditions upon the weight or gage of stock calendered.

9. The Adamson-United Company has recently been running advertisements in the rubber trade journals showing that in an average rubber plant at least $1 per minute or $720 per 12 hour day can be saved through more precise calendering (reducing the rubber coat by only one-half of one thousandth of an inch). This is absolutely correct and the process capability technique of quality control is the means of determining whether or not the equipment and/or process is precise enough.

10. Finally, and perhaps most important, knowledge of the process leads to *greater uniformity of product.* It is difficult to place any tangible value upon quality, performance of product, consumer reaction, etc., but in many cases it can exceed the dollar savings within a plant due to elimination of overages, scrap rework, etc.

Polyethylene in Low Voltage Submarine Cables

POLYETHYLENE, used widely in several phases of the wire and cable industry, has now been demonstrated to be an asset to the manufacture of low voltage submarine cables, according to the Bakelite Corporation. A number of actual installations, coupled with laboratory tests, have provided data which promise to promote the successful use of this plastic material in this application.

The extremely low rate of water absorption of polyethylene is the outstanding feature when used in these cables. However, as in other wire and cable installations, the other unusual properties of polyethylene contribute to the overall success; chemical stability, light weight, inherent flexibility, toughness, and ease of fabrication.

The U. S. Coast Guard has 21 nautical miles of submarine cable in operation which uses polyethylene as insulation. The low dielectric constant and power factor of the plastic permitted a smaller construction than those made with rubber, and contributed to easier handling and installation. The cable, installed in 1945 and used for telephone circuits has been periodically tested and continues to show low attenuation.

A multi-conductor railway signal cable used in a river crossing, also installed in 1945, was designed with No. 14 A.W.G. stranded wire as conductors, insulated with only 2/64 in. of polyethylene, and protected with conventional jute and armor wires. The cable has been tested at six months' intervals and no sign of deterioration of the polyethylene or other trouble with the wire has been found.

The most ambitious submarine cable project reported in which polyethylene was chosen as the insulation is a submarine cable laid between Aldeburgh, England, and Domburg, Holland, in 1947. The cable had the following construction: Polyethylene core, copper tapes, polyethylene cord wound in an open helix, solid polyethylene insulation, copper tapes, and conventional protection of jute, armor and jute. With the open helix the dielectric is partly air, and short sections of solid polyethylene are provided at intervals as added protection. The cable is 85 miles long and is used for telephone circuits at carrier frequencies up to 500 kilocycles. It can handle 600 duplex telephone channels.

Laboratory tests on polyethylene verify its low water absorption, and subsequent tests on physical and electrical properties show that there is no significant change in these properties after immersion.

Safety in the Rubber Laboratory

WITH the increasing importance of research and technical control in the rubber factory, more concern must be given to accident prevention in the laboratory. The hazards common in rubber laboratories are quite different from those incident to most chemical laboratories. The rubber chemist does very little work with strong acids and corrosive materials, and there is comparatively little use of glassware in the ordinary rubber laboratory.

The rubber laboratory is usually equipped with a small rubber mill and other power-driven equipment. All too often the production machinery of a plant is well guarded while the laboratory machines are neglected. A 12-inch mill may not kill quickly, as a 60-inch mill can, but it can mangle a hand. The newer laboratory mills are equipped with good brakes operated by knee level safety bars. Many of the older models have no safety bar or rope at all.

Many rubber laboratories are equipped with calenders. A calender should have a safety bar or safety rope within the reach of anyone working with it, regardless of which side of the machine he is on. Effective safety ropes are easily installed. Many laboratory machines may be heated with steam. The steam pipes should be covered with insulation to prevent technicians from being burned.

Next in importance to the mechanical hazards is the danger of fires and explosions. Most laboratories use a considerable amount of rubber solvents, almost all of which are highly flammable. Too often these solvents are used close to burners with open flames. It is highly recommended that no open flame burners be used within 20 feet of even small amounts of flammable solvents. No solvents should be present in uncovered containers in a room with an open flame. So far as possible, open flame burners should be replaced by steam or electrically heated hot plates. Approved safety containers should be used for all solvents for swabbing or washing.

Except in the larger rubber companies, the very nature of laboratory work and the technicians themselves have made accident prevention somewhat difficult. Most laboratory procedures are not routine. The technicians are likely to be less amenable to job training than production workers are. These factors help make the problem of safety in the rubber laboratory one which merits extra attention.

Rubber Safety News Letter

Gas Infra-Red and High Air Velocity System for Drying and Curing Latex Backing on Carpets

A GAS infra-red and high air velocity system for drying and curing latex backing on carpets has been developed by the Process Heating Co., Inc., 46 Herkimer Place, Brooklyn 16, N. Y., manufacturers of ovens, conveyors and gas and electric infra-red equipment. The system incorporates gas infra-red generators as the source of convected and radiant heat, and large volume fans with high velocity air jets as the means of impinging air, at velocities upwards of 2000 feet per minute, against top and bottom of the carpets.

A stainless steel balanced spiral conveyor, 7 feet wide by 100 feet long and powered by a 4-foot to 28-foot per minute variable speed drive, conveys the carpets through a two-zoned 50-foot insulated oven. The drying and curing zones are each equipped with a 7-foot gas infra-red generator facing down and four air cooled large volume fans, two above the conveyor belt and two below. Both zones have separate exhaust systems for removing saturated air and volatiles, and indicating temperature controllers for maintaining uniform heat throughout the oven.

A "Premix" air-gas combustion system is used for supplying fuel to the gas infra-red generators which burn manufactured, natural, propane, butane or vaporified gases. The "Premix" system includes a high pressure turbo-blower, automatic butterfly air valves, atmospheric gas pressure regulators and aspirator mixers. Blast pilots, also with a "Premix" system, are employed to ignite the generators. These pilots have automatic spark-plug ignition.

To meet Factory Mutual requirements, safeguarding controls have been installed on both the oven and conveyor. This equipment includes safety shut-off valves, relays, air flow switches and flame controls.

Offers Wide Production Range

The drying and curing range was designed to produce from 4,000 square feet of carpet per hour with a heavy latex spray to 10,000 square feet per hour with a light spray. The drying and curing cycle varies from 2 to 5 minutes depending on the latex application.

Latexed carpets are treated to thermal shocks of radiant heat in both the drying and curing zones as they pass under the infra-red generators. These generators are located in the first 3-foot section of both zones. In the remaining sections the carpets are hit on both sides with high velocity air. The air temperature in the drying zone is maintained at 250° F., and in the curing zone at 350° F.

The temperature controllers actuate a motorized air valve which not only modulates the oven temperature but also raises or lowers the intensity of the radiant heat. The temperature of each zone is also independently regulated by means of butterfly air valves.

The operating costs of the drying and curing range are said to run approximately a fraction of a cent per square foot of carpet, since the gas infra-red generators, having a high heat release and operating very efficiently with the "Premix" system, consume very little gas. Consumption of propane gas based on 2500 BTU per cu. ft. is 400 cu. ft. per hour. Outside the normal greasing of motors and bearings, there is very little maintenance on the heating equipment, oven and conveyor.

This range, primarily designed for the carpet industry, lends itself readily to such drying, baking and curing applications as the drying and curing of resins on textiles, baking of enamel on metal and plastic surfaces, drying of fur, setting of nylon, drying and baking of food products, curing of printed dyes on textiles, flashing of vinyls on paper, drying of paper, etc.

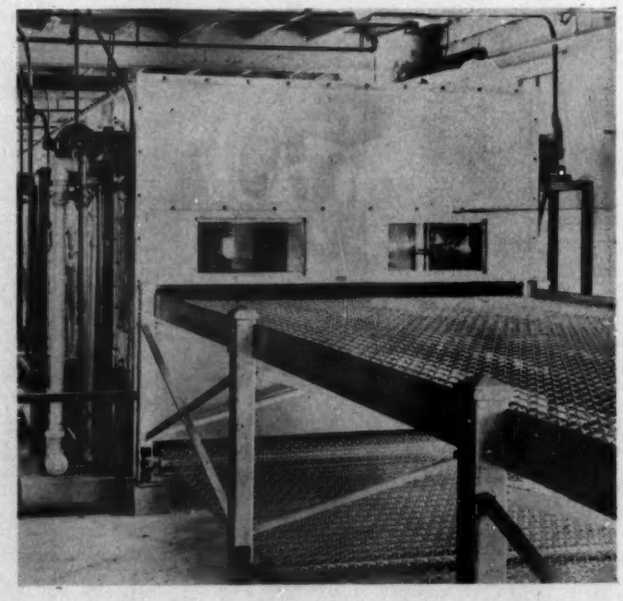
Requires No Outside Heat Units

Inasmuch as the range is a self-contained unit with the source of heat an integral part of it, outside sources of heat, such as boilers for high pressure steam supply or gas fired air heaters, are not required.

Push button controls for running the machine have been mounted on a centralized panel board and have been so simplified that an ordinary mechanic can master them within several minutes.

Oil-to-gas converters designed to vaporize No. 1, No. 2 or No. 3 oil can be supplied where manufactured, natural or bottled gas is not available. The cost of burning vaporized gas runs in line with the other gases.

According to the manufacturers, the process heating drying system incorporated into the range has proven itself to operate at approximately one-half the cost of steam heaters and about one-eighth that of electric heaters. Initial installation costs of the entire unit are said to run well below those of steam and electric-heated ovens.



View of new drying and curing range.

Editorials . . . . . .

Mandatory Consumption

ONE of the concrete results of the Anglo-American-Canadian conference held in Washington, D. C., earlier this month is of major importance to the rubber manufacturing industry. The conference was held to examine the trade and financial relationships between the sterling area and the dollar area, the pound and the dollar being the two principal world trading currencies, and the net result of the meeting was a three-way agreement to put the sterling area on a basis of paying its own way by 1952. A series of measures to ease the dollar crisis and end the drain on British gold and dollar reserves will also be undertaken.

It is one of these measures which affects the rubber industry at large. The United States has agreed to modify the existing regulations covering the mandatory consumption of synthetic rubber as part of an over-all scheme "to open to natural rubber a substantial additional area of competition." Furthermore, the United States has agreed to "review its stockpiling program," with special respect to rubber and tin. As a part of the tripartite agreement, Canada, too, will undertake to expand her own purchases of rubber and tin from the sterling area, which sets up a special problem for that country.

The agreement to modify mandatory consumption requirements of synthetic rubber was reached over the bitter opposition of the Commerce Department and the Munitions Board. The latter organization has long been adamant in its stand against reducing mandatory use below the 200,000 tons of GR-S required under the Rubber Act of 1948. The Commerce Department is charged with carrying out the provisions of Rubber Order R-1, which at present restricts the amount of natural rubber which can be utilized in transportation goods. The State Department, which participated in the tripartite talks, has long favored a reduction in mandatory use as a good-will gesture toward the British. Because of this inter-governmental wrangle, it is quite likely that a White House decision may be required to determine the specific reduction to be made.

Actual concessions to be made are currently being worked out by the various government agencies concerned with rubber and will be passed on for inter-agency clearance at a high level. No estimate of the reduction has been made by any official at this writing, but it is clear that if any decided advantage is to be secured by the natural rubber interests the reduction will have to be drastic, and not a token reduction as was the case in the last modification of the rubber order which permitted the theoretical use of an additional 14,000 tons of natural rubber.

By far the major reduction will have to be in the mandatory consumption of GR-S. As indicated above, present regulations call for the mandatory consumption of 200,000 tons per year of general purpose synthetic rubber (GR-S) and 22,000 tons of special purpose synthetic rubber (GR-I). Voluntary consumption of GR-S is currently running at the rate of 90,000 tons a year. Accordingly, based on those figures, a reduction of some 90,000 tons in the annual mandatory usage could be instituted without danger to national security as defined in the Rubber Act of 1948. It is our guess that mandatory consumption of GR-S will be reduced to approximately 140,000 tons a year.

The primary object behind the decision to reduce mandatory consumption of synthetic rubber in the United States is, of course, an attempt to permit the importation of greater quantities of natural rubber and thus help ease Britain's dollar position. Again reverting to statistics, it is difficult to see how this can be accomplished other than by forcing an increase in the price of natural rubber. According to the latest report of the Secretariat of the Rubber Study Group, world consumption of natural rubber in the first six months of the current year exceeded production by some 30,000 tons, the figures being 732,500 and 700,000 tons, respectively. In any case, the next few months will tell the story.

CURRENT NEWS OF THE MONTH

B. F. GOODRICH WORKERS STRIKE FOR FOURTH ROUND PAY INCREASE

Negotiations between the B. F. Goodrich Co. and the United Rubber Workers, CIO, were still being carried on at this writing in an attempt to settle a strike which has idled more than 21,000 employees in seven plants of the company. The walkout was called on August 27 when the parties were unable to agree on several contractual issues.

Current negotiations with Goodrich involve renewal of the entire company-union contract, in contrast with the situations applying to other big rubber companies. Contracts with Goodyear, Firestone and U. S. Rubber, for example, run until next year and only the union's pay demands are open to discussion at that time.

The union's economic demands include a 25-cent-an-hour wage increase, $100 a month company-financed pensions and other health and welfare benefits. Goodrich has estimated that the union's demands would cost the company some $82,000,000 in 1950 if granted. Declining business in the rubber industry makes the union's demands impossible, according to the company.

Chief among the controversial changes demanded by the company for the new contract, according to the union, is a no-strike pledge, making the URW liable for any work stoppages which might occur in the company's plants. The URW claims this would make the union answerable for actions of both union and non-union workers.

The union has also refused to agree to a company demand for the right to file grievances against the union which can be carried to arbitration. This, the union claims, is an attempt to "break" the union financially, since half the costs of arbitration would have to be paid by the union locals. Other issues in controversy include vacation pay and restrictions on workers to remain at their machines throughout each shift aside from "personal time" allowances.

The strike, called by the international union in a surprise move following final negotiating sessions with the company, called 11,000 workers from their jobs in Akron and about 6,000 in Goodrich plants located in Cadillac, Michigan, Los Angeles, Calif., Tuscaloosa, Alabama, Miami, Oklahoma, Clarksville, Tenn., and Oaks, Penna. In addition, some 4,000 white-collar workers in Akron and 600 at the other plants of the company were idled by the strike as picket lines were thrown around the plants.

Additional Labor Activities

Negotiations on wage issues between the General Tire and Rubber Co. and the URW were recessed on September 3 after three days of discussion brought no agreement. The contract between the union and the company runs until April 30, 1950, but allows reopening of the wage issue. The union's demands for wage increases, as well as pension plans, parallel those in the Goodrich situation. The negotiations may be resumed at an early date.

On September 8, Local 283 of the URW announced that its members had voted to accept a decrease in piece-work rates from the Norwalk Tire & Rubber Co., thereby averting a strike that had been called by the union for September 30. The reduction, which cut workers' pay from 2 to 13%, will be on trial for six months. Norwalk Tire officials said it was hoped that the temporary lowering of wages would enable the company to regain its financial footing and increase production so that employees recently laid off might be recalled to work in the next few weeks.

Modification Coming

According to the joint communique issued on September 12 on the conclusion of the Anglo-American-Canadian financial talks held in Washington, D. C., the U. S. Government is prepared to open to natural rubber a substantial additional area of competition "including a modification of the government order relating to the consumption of synthetic rubber." The United States has also agreed to review its stockpile program "with particular reference to rubber and tin." A drastic change in Rubber Order R-1 is expected shortly as a result of the Washington meeting.

Acquires Lowell Insulated Assets

The assets and physical properties of the Lowell Insulated Wire Co., of Lowell, Mass., have been acquired by the Overlakes Corporation of 19 Rector St., New York 6, N. Y., steamship freight operators active in the Great Lakes region. Operations of the company will be continued under the name of the Lowell Insulated Wire Division of the Overlakes Corporation. It is the intention of the new owners to continue production along present lines and gradually expand the types of wire offered by the company. John Robinson, formerly associated with the Acorn Insulated Wire Co., has been placed in charge of the Lowell plant as general manager. Fred Hewitt, Jr., is president of the Overlakes Corp. Assets of the Lowell Insulated Wire Co. were offered for sale recently after the death of W. B. Dunsford.

PROGRAM COMPLETED FOR MEETING OF ASME RUBBER-PLASTICS GROUP

The Rubber and Plastics Division of the American Society of Mechanical Engineers has completed its program for presentation at the divisional meeting to be held on Wednesday, September 28, at the Hotel Lawrence in Erie, Penna. Two technical sessions wil be held in conjunction with the 1949 Annual Meeting of the parent society.

Six papers are scheduled for presentation at the divisional meeting, three on plastics and three on rubber. The three plastics papers, to be presented at the morning session on September 28, include "Strength-Variance Studies of Plastics," by W. J. Gailus, of the Massachusetts Institute of Technology; "Effect of Fuel-Immersion on Laminated Plastics," by W. A. Crouse, Margie Carickhoff, and Margaret A. Fisher, of the National Bureau of Standards, and "Creep and Fatigue Properties of Plastic Laminates," by W. N. Findley and W. J. Worley, of the University of Illinois.

The three rubber papers, to be given at the afternoon session, are: "Advances in Heavy Rubber and Plastics Machinery," by Donald C. Chase, of the Farrel-Birmingham Co.: "Development of Machinery for the Curing of Tires," by L. E. Soderquist, of the McNeil Machinery and Engineering Co., and "Time as a Process Variable," by J. S. Detwiler, of the Taylor Instrument Companies. Abstracts of all six papers will appear in our next issue.

Membership in the A. S. M. E. is not a requisite for attendance at A. S. M. E. meetings. However, a registration fee of $3.00 is charged to non-members for admission to one or all of the technical sessions held.

Simplex-Anhydrex XX Compound

Simplex Wire & Cable Co., Cambridge 39, Mass., has introduced a high-voltage power cable insulation, said to have all the desirable properties needed for this type of service. Called Simplex-Anhydrex XX, the new insulation has extremely high heat resistance. Simplex guarantees that this insulation wil operate at 176° F. in dry locations up to and including 8,000 volts, and 167° F. under all conditions of installation and operating voltages. Simplex-Anhydrex XX is, to all intents, inert to the action of ozone, oxidizing agents and sunlight. The maximum water absorption of the compound does not exceed 15 milligrams per square inch of exposed surface when immersed in distilled water at 70° C. for 7 days.

CENSUS BUREAU ISSUES REPORT ON RUBBER INDUSTRY FOR 1947

The Bureau of the Census of the U. S. Department of Commerce has made available its statistical survey of the rubber manufacturing industry for the year 1947. The report covers those establishments primarily engaged in the production from natural or synthetic rubber of products such as tires, inner tubes, footwear, heels, soles, coated fabrics, gloves, mechanical goods, drug and mechanical sundries, etc.

The 1947 census indicates that in that year there was a total of 860 rubber manufacturing establishments employing a total of 257,022 persons who earned a total of $776,615,000. These figures break down to show that of the total rubber manufacturing establishments, 57 produced tires and tubes, 26 produced rubber footwear, while 777 plants produced a great variety of goods consisting primarily of mechanical rubber goods, miscellaneous rubber specialties and sundries, rubberized fabrics, etc.

The tire and tube plants employed 115,657 persons who earned $390,841,000. The footwear employees, numbering 28,125, earned $72,666,000 during 1947. The miscellaneous producing units employed 113,240 persons who earned $313,108,000 during the year.

Tire and Tube Shipments

The report indicates that in the year of 1947, tire and tube manufacturing installations shipped goods with a value of $1,547,040,000, while the rubber footwear manufacturers shipped products valued at $198,691,000. Miscellaneous rubber products shipped during 1947 were valued at $953,453,000. The total value of rubber goods shipped during the year amounted to $2,699,184,000.

A total of 108,803,532 pneumatic casings were shipped during 1947. Included in this total were 75,786,596 passenger casings; 17,172,006 truck and bus casings, including off-the-road tires; 203,453 motorcycle tires; 9,417,139 bicycle casings and single tube tires; 154,703 airplane tires; 4,832,673 tractor and implement tires; and 1,236,962 industrial casings. Solid tires shipped during 1947 totaled 2,572,476 units.

In the same year a total of 129,475,906 inner tubes were shipped, including 98,877,087 passenger car tubes; 14,065,791 truck and bus tubes; 11,351,279 motorcycle and bicycle tubes; 94,189 airplane tire tubes; 3,894,376 tractor and implement tubes; and 1,193,184 industrial tubes.

Other Products Shipped

The census report shows that a total of 133,528,758 pairs of rubber footwear of all types were shipped in 1947. Camelback shipped during 1947 totaled 96,284,395 pounds. Heels shipped during 1947 totaled 317,622,891 pairs, and soles, 117,342,584 pairs. A total of 140,731,784 pounds of belting of all types were shipped during that year.

Hose of all types shipped during the year amounted to 116,100,850 pounds, and all tubing, except reinforced, totaled 21,326,713 pounds. Molded and extruded goods shipped during the year, except for sponge and hard rubber and tubing, totaled 167,594,617 pounds. Latex foam sponge rubber shipped during the year amounted to 18,587,629 pounds, and 29,405 mattresses made of this material were also shipped. Chemically blown sponge shipped during 1947 totaled 43,967,903 pounds.

Other miscellaneous items shipped during the year included rubber cement, 17,649,571 gallons; balloons, 7,382,491 gross; bathing caps, 879,674 dozen; rubber thread, both bare and covered, 10,496,556 pounds; household gloves, 604,297 dozen pairs; surgeons gloves, 1,165,269 dozen pairs; and electricians and work gloves, 17,300 dozen pairs.

Set Fourth Plastics Exposition

The Fourth National Plastics Exposition will be held on March 28, 29 and 30, 1950, at the Navy Pier, Chicago, Ill. As usual, it will be restricted to the trade only. Dale Amos, general manager of the Amos Molded Plastics Co., Edinburg, Indiana, is chairman of the committee in charge.

Susie Named Research Head

Dr. Alfred G. Susie, chief chemist of the Marbon Corp., Gary, Ind., for the past four and a half years, has been appointed supervisor of research at the Armour Research Foundation of the Illinois Institute of Technology, Chicago, Ill. Dr. Susie will be in charge of research projects dealing with plastics in the Chemistry and Chemical Engineering Department of the Foundation. While at Marbon, Dr. Susie worked on rubber compounding, plastics, and rubber-to-metal adhesives. He holds five patents dealing with organic synthesis and wetting agents. From 1939 to 1945, he was project leader for the Esselen Research Corp., Boston, Mass., where he engaged in chemical consulting work. From 1932 to 1936 he was a chemist at the Sun Oil Co., Toledo, Ohio. Dr. Susie received his Ph.D. from Purdue University in 1939. He earned his M.S. from Toledo University and a B.S. from Ohio Northern University. For the past two years, Dr. Susie has been publicity director of the Chicago Rubber Group. He was a member of the executive committee of that organization for two years.

EXPERIMENTAL RUBBER-SURFACED PLAYGROUND COMPLETED IN AKRON

Goodyear Tire & Rubber Co. has completed the test installation of a rubber-surfaced playground in Akron, Ohio. The experimental surfacing was laid down at the Rankin School, with ground-up rubber replacing the conventional asphalt mixture. The installation was made by the Portage Bituminous Co., with Goodyear supplying the rubber.

Substitution of rubber for the slag, according to officials of Goodyear's research laboratory, should materially reduce the skinned arms, legs and faces of youngsters falling at play. The rubber, being resilient, has no sharp abrasive edges to injure the skin.

In installing the rubber play yard, crushed stone was first applied as a foundation. This was then sealed with a "hot mix" asphalt. This base then was covered with a half-inch of ground rubber, then rolled to impregnate the rubber particles into the asphalt.

This material, Goodyear officials state, is comparable to rubber-asphalt experimental highways being installed by various highway departments about the country, except that the top surface of the playground material is entirely free of abrasive materials.

TIRE PRICE STABILITY IS INDICATED IN GOODYEAR STUDY

Current level of automobile tire and truck tire prices furnish a welcome contrast to the trend of most consumer items over this decade.

Recent study by Goodyear Tire & Rubber Company statisticians show many tire prices at about the same or only slightly higher figures than these same sizes sold for in 1939. And in some instances, the prices are even lower than a decade ago. Weighed against this is the general consumer price index recently placed at approximately 70 per cent over the nearest prewar figure, according to the U. S. Department of Labor.

While tire prices have maintained this almost miraculous stability, Goodyear and the rest of the rubber industry have been making tires consistently better, so that the purchaser today receives considerably more tire miles for his dollar. Going still further, Goodyear engineers point out that researches show tires generally to be considerably better than just prior to Pearl Harbor.

Several reasons are ascribed, the technicians say. One is the better methods of tire compounding now used. Another is the modernized and improved manufacturing processes that have been introduced gradually, during and since the war.

In the case of truck tires, for example, the use of rayon fabric in all Goodyear-built tires of this classification has resulted in a far superior product to the best tire that the rubber industry acclaimed in the preceding decade.

Continuing truck tire comparisons, here are several outstanding examples of their price trend. In 1939, list price of an 8.25 tire was $71.90. Today the same size lists at $63.95. A spot check further shows a 10.00-20 truck tire listed in 1939 at $108.60, now priced at $100.40.

These are reasons why spokesmen for the rubber industry take pride in pointing to tires as earning that rare distinction, along with the oft quoted "aspirin tablets, 'cokes' and razor blades," as being one of the few products remaining unchanged in price.

At their present rate, and incorporating the many improvements of the last 10 years, current tire prices obviously represent a true bargain, these individuals say.

Coming Events

Sept. 28. A.S.M.E. Rubber & Plastics Div., Lawrence Hotel, Erie, Penna.

Sept. 29. Northern Calif. Rubber Group, Claremont Hotel, Berkeley, Calif.

Oct. 4. Los Angeles Rubber Group, Mayfair Hotel, Los Angeles, Calif.

Oct. 7. Detroit Rubber Group, Detroit-Leland Hotel, Detroit, Mich.

Oct. 10-14. A.S.T.M., West Coast Meeting, Fairmont Hotel, San Francisco, Calif.

Oct. 11. Buffalo Rubber Group, Hotel Westbrook, Buffalo, N. Y.

Oct. 14. Boston Rubber Group, Somerset Hotel, Boston, Mass.

Oct. 20. Quebec Rubber & Plastics Group, Canadian Legion Hall, Montreal, Canada.

Oct. 21. N. Y. Rubber Group, Henry Hudson Hotel, New York City.

Oct. 24-28. 37th National Safety Congress and Exposition, Chicago, Ill.

Oct. 27. Northern California Rubber Group, Claremont Hotel, Berkeley, Calif.

Oct. 28. Akron Rubber Group, Hotel Mayflower, Akron, Ohio.

Nov. 1. Los Angeles Rubber Group, Hotel Mayfair, Los Angeles, Calif.

Nov. 24. Quebec Rubber & Plastics Group, Canadian Legion Hall, Montreal, Canada.

Nov. 27-Dec. 2. A.S.M.E., Annual Meeting, New York, N. Y.

Dec. 4-7. American Institute of Chemical Engineers, Wm. Penn Hotel, Pittsburgh, Penna.

Dec. 9. Los Angeles Rubber Group, Xmas Party, Los Angeles Breakfast Club, Los Angeles, Calif.

Dec. 9. Detroit Rubber Group, Detroit-Leland Hotel, Detroit, Mich.

Dec. 10. Southern Ohio Rubber Group, Miami Valley Golf Club, Dayton, Ohio.

Dec. 16. N. Y. Rubber Group, Henry Hudson Hotel, New York City.

Dec. 16. Boston Rubber Group, Somerset Hotel, Boston, Mass.

HALF YEAR TOTALS INDICATE DROP IN CASING PRODUCTION

Production of all types of automotive casings in the first six months of 1949 totaled 39,649,779 units, compared with 42,260,254 casings produced in the first half of 1948, according to a recent report of the Rubber Manufacturers Association. During the first half of this year, 33,306,967 passenger casings and 6,342,812 truck and bus casings were produced, against 34,615,365 and 7,644,889, respectively, in the first half of the preceding year.

Casings shipped during the first six months of 1949 amounted to 37,023,244 units, while for the period ended June 30, 1948, 37,818,876 casings were shipped. A total of 31,257,229 passenger casings and 5,766,015 truck and bus casings were shipped in the first half of this year, compared with 30,725,386 passenger casings and 7,093,490 truck and bus casings shipped in the first six months of 1948.

As of June 30, 1949, there were 13,133,816 casings of all types on hand of which 10,618,442 were passenger casings and 2,515,374 were truck and bus casings. As of June 30, 1948, there were a total of 11,435,992 casings on hand, of which 9,331,738 were passenger casings and 2,104,254 were truck and bus casings.

A total of 34,508,903 passenger and truck and bus tubes were produced during the first six months of 1949, compared with 34,700,758 produced in the first half of 1948. Tubes shipped in the first half of 1949 amounted to 31,607,180 units, against the 32,630,934 tubes shipped in the period ended June 30, 1948. As of June 30, 1949, there were 12,465,760 passenger and truck and bus tubes on hand, compared with 9,996,572 units on hand at the end of the first half of 1948.

Offer Bulletin on Nonyl Phenol

A technical bulletin describing the properties, chemical reactions and uses of nonyl phenol, an alkylated phenol now being produced in commercial quantities at its Oil City plant, has been published by the Chemical Division of the Koppers Co., Inc., Pittsburgh 19, Penna. Nonyl phenol is described as a versatile organic intermediate useful for the manufacture of such products as surface-active agents, rubber chemicals, plasticizers, oil-soluble phenolic type resins, and corrosion inhibitors. The bulletin contains a list of 75 references to the technical literature. Copies are available on request to the company.

New Standard Hydrocarbon Samples

The National Bureau of Standards, Washington 25, D. C., has announced several additions to the series of compounds which are available for calibrating analytical instruments and apparatus in research, development and analytical laboratories. The new additions include the following: n-Tridecane; cis-2-Hexene; 4, 4-Dimethyl-trans-2-pentene; 1, 2, 3, 5-Tetramethylbenzene; 1-Methyl-4-tert-butylbenzene; Naphthalene, and 2-Methylnaphthalene.

Hinshaw Escaped Air Crash

Recently returned from a 30,000-mile, around the world trip by air, George K. Hinshaw, vice-president and production manager of Goodyear Foreign Operations, Inc., counts himself lucky to be alive. Mr. Hinshaw was unable, because of a slight illness, to make the flight on the Dutch air liner which crashed near Bombay, India, on July 12, killing 45 persons, including 14 top American newspapermen. Mr. Hinshaw was on a periodic inspection trip to some of the rubber manufacturing plants operated by Goodyear outside of the United States. He reports that production, generally, is going well at these plants.

Bass Named Officer of URW

George R. Bass, president of Goodrich Local 5, has been named secretary-treasurer of the United Rubber Workers of America (CIO) to succeed the late Charles E. Lanning. Mr. Bass, a powerful political figure in the international union, will serve as secretary-treasurer until the election of new officers at the 14th annual convention of the union which is scheduled to begin in Toronto, Canada, on September 19. The appointment came as somewhat of a surprise, since Mr. Bass is regarded as the principal candidate of the anti-Buckmaster faction for URWA president, a post he has been seeking for many years

COMMITTEE D-11 ON RUBBER ACTIVE AT ANNUAL MEETING

Committee D-11 on Rubber Products of the American Society for Testing Materials, and its subcommittees, held a total of some twenty meetings over a period of three days at the recent 1949 Annual Meeting of the parent society held in Atlantic City, N. J. A report of its activities follow:

Committee D-11 has been participating in the activities of Technical Committee 45 on Rubber of the International Organization for Standardization. The committee decided to extend an invitation to I.S.O. Committee 45 to hold its 1950 Meeting in the United States at Cleveland, in October, 1950, at which time Committee D-11 plans to hold a series of meetings.

Work is to be undertaken on crude rubber which work will be coordinated with that of other groups interested in such standards.

The committee will submit to the Society as tentative the proposed specifications and methods of test for concentrated, ammonia preserved, creamed and centrifuged natural rubber latex. These specifications are of international interest and in their present proposed form have been distributed to interested parties in a number of countries that produce rubber latex.

The Subcommittee on Thread Rubber reviewed the first draft of several procedures for testing this material. After changes the methods are to be submitted to a number of interested manufacturers and others for further study.

There were four new tentative specifications accepted covering rubber protective equipment for electrical workers. These covered line hose, insulator hoods, blankets, and sleeves. In the sleeves specifications a note is to be added pointing out that the 10,000-v. test voltage limitation is due to the testing procedure and not to the inherent nature of the material. It was reported that the Specifications for Electrical Gloves (D 120-40) are under extensive revision and will require a year before completion. The four specifications have also been approved for reference to the American Standards Association for approval as American Standards.

An important accomplishment of Committee D-11 this year was the revised specifications for latex foam rubbers and for sponge and expanded cellular rubber products. Some further changes are to be made in these specifications as the result of suggestions from the SAE-ASTM Technical Committee on Automotive Rubber. These revised specifications classify the material on a product basis and are very timely in view of extensive use of this material in automotive and other applications.

The Subcommittee on Packings submitted for publication as tentative the navy seal aging test. The Subcommittee on Physical Testing of Rubber Products presented an extensive revision of the Standard Methods of Tension Testing of Vulcanized Rubber (D 412-41). The revised methods are to be issued as tentative and will be submitted to the Standards Committee during the summer.

WHITE AND EDLAND HEAD NEW AMES RUBBER PLANT IN HAMBURG, N. J.

Laurence Edland

J. H. White, Jr.

The Ames Rubber Corporation, recently-organized subsidiary of the Ames Supply Co., of Chicago, Ill., has begun manufacturing operations in its new plant in Hamburg, N. J. Officers of Ames Rubber include Hazen R. Ames, president; J. H. White, Jr., executive vice-president and general manager; Laurence Edland, vice-president and sales manager; Dorothy R. Ames, treasurer, and C. T. Bills, secretary.

The plant occupied by Ames Rubber in Hamburg was built in 1945 and contains approximately 16,500 square feet. Mills, extruders, presses, and the usual rubber equipment for making mechanicals, extruded goods and rolls have already been installed and are operating. Approximately 50 are presently employed, and expansion is planned for the near future.

Mr. Ames, president of the new company, is also president of the Ames Supply Co. and has been active with that company for the past 24 years. Ames Supply has been in business since 1902 and supplies parts for all types of business machines. Mrs. Dorothy Ames, treasurer, is executive vice-president of Ames Supply, with which she has been associated since 1910. Mr. Bills, secretary, has been an official of Ames Supply for the past 12 years, with headquarters in Chicago.

Mr. White, executive vice-president of Ames Rubber, was formerly vice-president and general manager of the Rodic Rubber Co., and before that was chief of administration and manufacture at Picatinny Arsenal. Mr. Edland, vice-president and sales manager, formerly occupied a similar post with Rodic Rubber, and prior to joining Rodic Rubber had been associated with the R. T. Vanderbilt Co. in a sales capacity for some 16 years. Mr. White and Mr. Edland will head up all activities at the Hamburg plant.

Rubber Streets For New York

New York City has started an experiment in the use of rubber road surfacing materials. Six stretches of street pavement are being laid containing a new "meltable" rubber compound, in a cooperative test by the Office of Manhattan Borough President and the U. S. Rubber Co. The rubber compound, known as Surfa-Sealz, is blended with the asphalt commonly used in making black-top pavement. In this first use of rubber pavement in New York City, approximately 200 tons of pavement surfacing containing rubber are being applied in areas which carry heavy city traffic. They are the West Side Highway, north of Chambers Street; 51st Street, between Madison and Lexington Avenues; Second Avenue, between 40th and 41st Streets; Lexington Avenue, between 42nd and 45th Streets; 25th Street, between First and Third Avenues; and Academy Street, between Sherman and Vermilyea Avenues. The tests are expected to be completed in about one year.

OTS To Continue Services

The Office of Technical Services of the U. S. Department of Commerce has announced that it will continue its basic technical-information services for industry during the coming 12-month period. The OTS, which was granted a slight increase in its appropriation for the current fiscal year, will emphasize services particularly useful to smaller firms. It was also announced that the *Bibliography of Technical Reports*, the OTS journal of technical abstracts, has been halved, and that it is now available at $5 per year. Emphasis will be placed on selecting the most promising reports, and providing descriptive information with each regular entry. A "Newsletter" is also being published monthly, and is available at 50 cents per year. It is a bulletin highlighting business opportunities arising from federal research. Subscribers to the *Bibliography* receive the "Newsletter" without additional cost. Free sample copies of the "Newsletter" are available from OTS on request.

Named Tire Development Manager

W. E. Lyon

W. E. Lyon, associated with the Firestone Tire & Rubber Co., Akron, Ohio, since 1929, has been named tire development manager of the company. Mr. Lyon, a native of Walton, N. Y., joined the Firestone organization's 1929 college training class following his graduation from Cornell University where he received his engineering degree. His first assignment was on tire specifications and quality control in the Tire Engineering Department. After 11 years of varied experience in the department, he was named its manager in 1940, a position he held until his present appointment. During World War II, Mr. Lyon was active on several Government and military advisory committees concerned with the development and use of tires. He is a director and past president of the Tire and Rim Association and a past chairman of the Akron-Canton chapter of the Society of Automotive Engineers. Mr. Lyon succeeds B. Darrow, who recently resigned after more than 35 years of active service in the tire industry.

Rubber Production in Sweden

Swedish firms produced 318,000 tires in 1948, consisting of 162,000 passenger car tires and 156,000 truck and bus tires, according to a recent report of the U. S. Department of Commerce. In addition, Sweden produced about 10,000 tractor and similar type tires. Production of rubber goods continued to expand during 1948, and it is expected to expand still further in 1949, although not to the full extent of capacity. Shortages of raw materials may limit the output in 1949, and a further obstacle to capacity production may arise in the form of a buyer's market for all rubber products.

Intercontinental Moves Offices

Intercontinental Rubber Co., Inc., and the Continental-Mexican Rubber Co., Inc., have completed a move to new general offices in New York City. The firms are now located at 50 Broad St., New York 4, N. Y. The new telephone number is WHitehall 4-5660.

Two New Flexible Adhesives

Two new flexible adhesives for polyethylene-coated surfaces have been announced by the Naugatuck Chemical Division, U. S. Rubber Co., New York 20, N. Y. These adhesives, known as Dispersite 1789 and 1822-A, are aqueous dispersions suitable for brushing, spraying or roller coating. The first gives a gray-brown film on drying, whereas the other dries to a transparent, odorless film, suggesting its use in food packaging applications. Both types are said to have a ply strength of 10 pounds per linear inch when separated at a rate of 2 inches per minute. The company says these adhesives, which have been developed for sealing polyethylene bags or polyethylene-wax coated paper, should also find use in other applications where a flexible type of adhesive is required. Among the outstanding properties claimed for the adhesives are ability to bond to smooth surfaces, flexibility, water resistance, and freedom from fire hazard during handling. Modification of these compounds for special uses are also available.

July Consumption Drops 17%

Rubber consumption dropped 17% in July to 69,294 long tons from 83,664 tons in June, according to a recent report of the Rubber Manufacturers Association. The sharp decline in consumption was partially attributed to the numerous annual shutdowns in the industry for vacations and maintenance work. Consumption of natural rubber during July amounted to 39,329 tons, a reduction of approximately 16% from the previous month when 46,739 tons were consumed. Synthetic rubber consumption dropped to 29,965 tons from 36,925 tons in June, a reduction of approximately 19%. Consumption of reclaimed rubber followed the same general trend as new rubber, and was estimated at 16,028 long tons, against 19,355 tons the month before. For the first seven months of this year a total of 578,369 tons of rubber were consumed of which 329,636 were natural, and 248,733 tons were synthetic. Reclaimed rubber consumed during the seven month period amounted to 128,606 tons.

Consumption Exceeds Production

World consumption of natural rubber during the first seven months of 1949 exceeded world production by 22,500 long tons, according to estimates of the Secretariat of the Rubber Study Group. Consumption of natural rubber in the first seven months of 1949 was 840,000 tons, an increase of 45,000 tons over the same period of 1948. The 1949 figure includes 72,500 tons of estimated Russian imports, compared with 29,000 tons in the 1948 period. Total production for the first seven months of 1949 was 817,500 tons, 32,500 tons less than in the same period of 1948. Stocks of natural rubber at the end of July, excluding government stocks in the United States, United Kingdom, and France, are estimated at 680,000 tons, down 90,000 tons since the end of 1948.

Named Technical Representative

C. P. Louthan

Cather P. Louthan, former manager of compounding for tires, tubes, belts and molded rubber goods for the Gates Rubber Co., Denver, Colo., has joined the technical service staff of Godfrey L. Cabot, Inc., Boston 10, Mass. Mr. Louthan will headquarter at the company's Akron, Ohio, branch office and will act as technical representative in contact with rubber manufacturers throughout the United States and Canada. A native of Denver, Colo., Mr. Louthan was graduated from the University of Colorado in 1937, with the degree of A. B. in chemistry. Shortly thereafter, he joined Gates Rubber where he worked successively in the control and textile laboratories, and later became manager of the rubber testing laboratory. After working on special compounding problems and evaluation of new materials for several years, he was named compounding manager. In recent years, Mr. Louthan has been closely associated with the development and application of "cold rubber" in tires.

Chemical Division Expansion

An expansion program to increase production in the Chemical Division of the Goodyear Tire & Rubber Co. by 50% of its present capacity has been announced as well underway by company executives. Buildings and equipment installations located in Akron, Ohio, are expected to be completed by November 1, with production in gear well before the first of the year. The new facilities answer demands made on the division for various types of synthetic rubbers, copolymer resins, synthetic rubber latex and synthetic resin latex.

Edgar Passes Voting Control

Voting control in the Edgar Brothers Co., Metuchen, N. J., has passed to its employees under a recapitalization plan in which all of the large common stockholders either sold their stock to employees or exchanged it for new preferred stock. No change in current company policies is contemplated as a result of this move. Edgar Brothers are suppliers of rubber clays to the rubber industry.

CASING SHIPMENTS IN JUNE 10% ABOVE TOTALS FOR MAY

Manufacturers' shipments of automotive casings in June totaled 7,535,239, up 10.43% over the 6,823,703 casings shipped in May, according to a recent report of the Rubber Manufacturers Association. Of these totals, 6,598,518 passenger casings and 936,721 truck and bus casings were shipped in June, against 5,908,666 and 915,037 casings, respectively, shipped in May.

Passenger casings produced in June amounted to 6,470,724 units, against the 5,980,837 units produced in May. Truck and bus casings produced during June totaled 921,143, compared with 953,489 produced the month before. Total automotive casings produced in June amounted to 7,391,867 units, against 6,934,326 units produced in May.

At the end of June, 13,133,816 automotive casings were on hand including 10,618,442 passenger casings and 2,515,374 truck and bus casings. These figures compare with the end of the previous month when there was a total of 13,301,203 automotive casings on hand including 10,769,289 passenger car casings and 2,531,914 truck and bus casings.

Passenger and truck and bus tubes shipped during June totaled 6,409,215 units, compared with the 5,296,063 units shipped in May. In June, 6,430,026 units were produced, against the 6,088,164 tubes produced the month before. At the end of June there were 12,465,760 tubes on hand, compared with the end of the previous month when there were 12,410,463 tubes on hand.

Cold Rubber Plant in Houston

Facilities for the annual output of 30,000 long tons of "cold rubber" went into production recently at the Government-owned plant operated by the Goodyear Synthetic Rubber Corp. in Houston, Texas. Conversion of 24 of the plant's 48 reactors, and installation of refrigeration equipment, was authorized by the Government less than a year ago. Before conversion started the Houston plant had produced more than 600,000,000 pounds of conventional GR-S. The plant's remaining 24 reactors will continue production of this material, Goodyear officials stated. Goodyear Synthetic is a subsidiary of Goodyear Tire & Rubber Co., Akron, Ohio.

Russell Plans Branch Plant

Russell Manufacturing Co., Middletown, Conn., has announced that negotiations are under way for opening a branch plant in Bennettsville, S. C., about January 1, 1950. If plans materialize, a 54,000 square-foot building would be built at Bennettsville to be operated by a subsidiary known as the Russell Products Co. on a long-term lease with option to purchase. The plant will employ 135 persons at the start and will produce certain types of narrow fabrics. The new plant will give the Russell company facilities for production of new products and provide for expansion in present lines.

Distribute "Clambake" Packages

The committee in charge of the ill-fated clambake at the meeting of the Rubber Division, A.C.S., in Boston, Mass., on May 23, has forwarded a package to every purchaser of a ticket as a good-will gesture. The package has all the makings for a "clambake" including cans of clam chowder, lobster, lobster paste, pork and beans and Indian pudding. A box of maple sugar candy was also included. Although under no obligation to furnish the "clambake package," the committee distributed them in the interest of fair play. George W. Smith (DuPont) was chairman of the committee. Mr. Smith, incidentally, was recently named assistant manager of the Boston office of the DuPont Organic Chemicals Division.

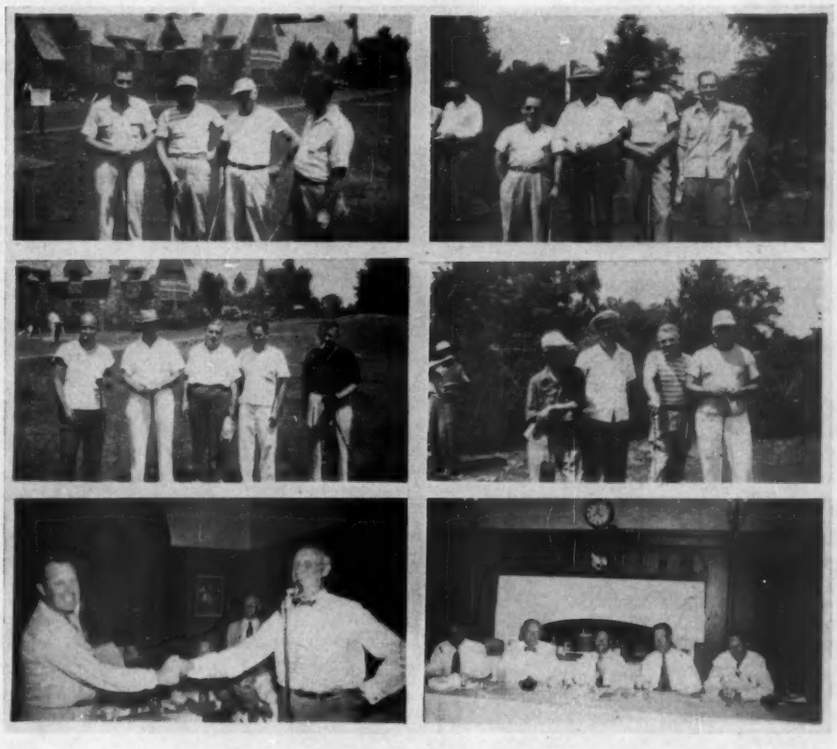
Buffalo Meets on October 11

The next meeting of the Buffalo Rubber Group will be held on Tuesday, October 11, at the Hotel Westbrook in Buffalo. The meeting will get started promptly at 5:00 P.M. W. A. Wiard, of the Dow Corning Corp., will speak on "Silicones." The after-dinner speaker will be N. Duffy, director of the Buffalo Airport, who will discuss some of the recent developments at the airport.

New York Group Golf Outing

The New York Rubber Group held its annual golf outing on August 9, at the Winged Foot Golf Club, Mamaroneck, N. Y. Members and their guests played the eighteen hole course and were served luncheon and dinner. Winners of the different events included: *Low Gross for Members,* F. F. Salamon, H. F. Jones; *Low Gross for Guests,* Wes. Curtis, F. J. Pechal; *High Score,* R. Reale; *Putting Contest,* V. Lake, Bill Rea, Bill Brandenburg, H. M. Royal, Frank Smith, Bill Rea, Jr.; *Hole in One (Nearest Pin),* R. G. Newberg, J. S. Corrigall, J. W. Holmes; *Kickers Handicap,* G. H. Provost, W. Lahey, W. S. Woodward, J. H. Rines, G. N. Brunt, D. LeFevre, T. F. Callahan, R. H. Eagles, R. Malcomson, J. W. Donegan, O. J. Lang, H. G. Ling; *Draw Prizes,* Ken Dugan, A. R. Partington, Cort Hicks, Pete Murawski, Tom Starkie. A raffle by the Club of a set of irons was won by H. W. Day. The Outing Committee included E. B. Curtis, chairman, and C. R. Haynes, T. T. MacConnell, J. H. Nesbit, A. H. Eufer, B. B. Wilson.

The 1949 Edition of Motor Truck Facts has been issued by the Automobile Manufacturers Association, Detroit, Mich. Data covering the year of 1948 is included.



A number of those attending the golf tournament held by the New York Rubber Group on August 9 are pictured in the panels above. UPPER LEFT: Mr. Sparks (Standard Oil), Mr. Newburg (Standard Oil), Mr. Hanson (Foster D. Snell), and Mr. Brandinburg (Barrett). UPPER RIGHT: T. T. MacConnell (U. S. Rubber Reclaiming), E. B. Curtis (Vanderbilt), W. Curtis, and W. L. McCabe (Flintkote). CENTER LEFT: F. M. Tolin (Vanderbilt), J. G. Zeiger (Shell Oil), V. Lake (Pioneer Latex), A. P. Block (Pioneer Latex), and W. McComb (Rubber Corporation). CENTER RIGHT: F. D. Chittenden, W. E. Bittle, A. K. O'Keefe, and D. L. McCollum, all of U. S. Rubber Co. LOWER LEFT: F. F. Salamon (Binney & Smith), low gross winner, and E. B. Curtis. LOWER RIGHT: A. H. Eufer (Vanderbilt), E. B. Curtis, T. T. MacConnell, J. H. Nesbit (U. S. Rubber Reclaiming), and W. Curtis. Photographs taken by Jesse S. Young, of the Advance Solvents & Chemical Corp.

NAMES IN THE NEWS

RAY NASON, formerly associated with the Philadelphia, Penna., office of the Pioneer Latex & Chemical Co., Middlesex, N. J., has been transferred to Rome, Ga., as Southern representative.

C. C. BASSET, JR., associated with the Industrial Fabrics Division of Burlington Mills Corp., New York, N. Y., has been appointed in charge of sales to the rubber, coating, laminating, electrical and allied industries.

MILTON GEORGE LUCKE, identified with the mechanical rubber goods industry since 1928, has joined Pioneer Rubber Mills, San Francisco 11, Calif., as superintendent of the Hose Department.

TOM K. SMITH, JR., formerly assistant branch manager of the Phosphate Division of the Monsanto Chemical Co., in Cincinnati, Ohio, has been appointed manager of plasticizers and resin sales for the Organic Division of the company with offices at the company headquarters in St. Louis, Mo.

W. S. RAYMER, JR., credit and office manager of the Sun Rubber Co., Barberton, Ohio, has been named to serve as president of the Akron Association of Credit Men for the 1949-50 season.

JOHN J. PADBURY, associated with the American Cyanamid Co., at Stamford, Conn., since 1943, has been named group leader of the polymers and resins group of the Research Division.

HOWARD H. WEBER has been appointed general sales manager of the Wire and Cable Department of the U. S. Rubber Co., New York 20, N. Y.

CHARLES A. MOORE has joined the Bearfoot Sole Co., Wadsworth, Ohio, as industrial relations administrator succeeding HUGH MCCULLOCH, who resigned recently.

DR. ERNST A. HAUSER, professor of colloid chemistry in the Department of Chemical Engineering at M.I.T., has been appointed visiting professor of colloid chemistry at Worcester Polytechnic Institute, Worcester, Mass., for the coming academic year.

ROBERT S. MARVIN, who has been working in the field of dynamic properties of rubberlike materials at the University of Wisconsin, has joined the rubber section of the National Bureau of Standards at Washington, D. C., as a physical chemist.

H. M. CORLEY, associated with Armour & Co., Chicago, Ill., since 1927, most recently as assistant director of research, has been named manager of the Chemical Division.

JOHN A. ROBINSON, associated with the Brown Instruments Division of the Minneapolis-Honeywell Regulator Co., Philadelphia 44, Penna., for the past 20 years, most recently as branch industrial manager of the Chicago office, has been named Midwest regional sales manager with headquarters at Chicago. CHARLES E. SHARP, associated with the Chicago office for the past five years, succeeds MR. ROBINSON as Chicago branch industrial manager.

TIMOTHY D. CALVIN, director of purchases and industrial engineer of the Bearfoot Sole Co., Wadsworth, Ohio, has been elected a director of that company.

CHARLES W. KLAUS, manager of carload sales at Chicago for the Diamond Alkali Co. for the past two and one-half years, has been named to take complete charge of Diamond sales activities affecting the seven-state area of Illinois, Indiana, Iowa, Michigan, Minnesota, Wisconsin and Nebraska.

NORMAN BEKKEDAHL, of the National Bureau of Standards, has been named chairman of the recently-organized Natural Crude Rubber Committee of A.S.T.M. Committee D-11 on Rubber Products. The committee will operate as Subcommittee XII.

PAUL W. BECKER, formerly with the Plastic Wire & Cable Corp., has been named factory manager of the new Hazleton, Penna., plant of the Electric Auto-Lite Co.

JEWETT F. NEILEY, director and hide buyer of the Endicott Johnson Corporation, Endicott, N. Y., has been named a member of a four-man mission to Germany to confer with E.C.A. authorities in that country with regard to the expenditure of Marshall Plan funds in procuring raw materials for the German leather industry.

H. C. SPARHAWK has joined the sales staff of the Chicago, Ill., office of L. Albert & Son.

THOMAS L. FAWICK, president of the Fawick Airflex Clutch Co., Cleveland, Ohio, has been chosen as one of this year's winners of the John Price Wetherill Medals of the Franklin Institute of Pennsylvania.

MARSHALL J. MURPHY has been appointed general superintendent of all departments of the Wheeler Insulated Wire Co., Waterbury, Conn.

A rayon tire cord plant in Australia is planned by Courtaulds, Ltd., major British rayon company. The plant will probably be located in New South Wales and is expected to cost about $20,000,000.

Lundell Receives Fisher Award

The $1,000 Fisher Award in Analytical Chemistry will be given to Dr. G. E. F. Lundell at the national meeting of the American Chemical Society in Atlantic City, N. J., on September 19. Dr. Lundell retired as chief of the Chemistry Division of the National Bureau of Standards last year. The award will be made by Dr. Linus Pauling of the California Institute of Technology, who is president of the society. Dr. Lundell was cited particularly for his "direct contribution to applied inorganic analysis by devising new and improving old methods, and for his ability to train young men in the ways of analytical chemistry." The award was established in 1947 by C. G. Fisher, president of the Fisher Scientific Co., Pittsburgh, Penna., to "recognize and encourage outstanding achievement in the science of analytical chemistry."

Joins Washington RMA Staff

W. J. Sears, vice-president of the Rubber Manufacturers Association, who formerly maintained his headquarters in New York City, has moved to the organization's Washington, D. C., office. The association said the move was made with a view to expanding the services of its Washington staff in work with the security agencies and the rubber production and rubber control offices of the government. Mr. Sears served with several key government agencies during the war, including a tour of duty as rubber director in the reconversion period. He has since served in the capacity of special consultant to ECA and the National Security Resources Board.

Dissolve Textile Institute

Dissolution of the Cotton Textile Institute was voted recently by its board of directors, and the trade association will merge with the American Cotton Manufacturers Association in a new organization to be known as the American Cotton Manufacturers Institute. The action for the dissolution, it was stated, following a meeting of the board, is contingent upon similar action to be taken by the board of governors of the American Cotton Manufacturers Association. The action of the boards of the two associations does not become final until membership of both groups vote approval.

Goodyear Expands Vinyl Plant

An expansion program which doubles the output of its vinyl resin plant at Niagara Falls, N. Y., has been announced by the Goodyear Tire & Rubber Co. The plant, operated by the Pathfinder Chemical Corp., a Goodyear subsidiary, supplies Pliovic resins for use by the plastics industry in the manufacture of cast and calendered films for the fabricating trade, and for coatings, dipping and spreading operations. The Pathfinder subsidiary consists of five processing buildings on the outskirts of Niagara Falls.

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EPC (Easy Processing Channel)

MICRONEX W-6

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VFF (Very Fine Furnace)

STATEX-K

◆

FF (Fine Furnace)

STATEX-B

◆

FEF (Fast Extruding Furnace)

STATEX-M

◆

HMF (High Modulus Furnace)

STATEX-93

◆

SRF (Semi-Reinforcing Furnace)

FURNEX

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NEW POLYMERS AUTHORIZED BY OFFICE OF RUBBER RESERVE, RECONSTRUCTION FINANCE CORPORATION

Listed below are types and properties of new experimental GR-S polymers (including GR-S latices) which have been authorized by the Office of Rubber Reserve, Reconstruction Finance Corporation, since publication of those in our previous issue. Procedures for the distribution and sale of these polymers will be found in our October, 1945, issue. Normally, experimental polymers will be produced only at the request of the consumers and 20 bales (one bale weighs approximately 75 pounds) of the original run will be set aside if possible for distribution to other interested companies for their evaluation. The 20 bales when available will be distributed in quantities of one or two bales upon request to the Sales Division of Rubber Reserve or will be held for six months after the experimental polymer was produced unless otherwise consigned before that time. Subsequent production runs will be made if sufficient requests are received to warrant them.

X Number	*Manufacturing Plant*	*Date of Authorization*	*Polymer Description*
X-539 GR-S	Goodyear, Torrance	5-17-49	GR-S stabilized with PBNA to be used as the standard reference test sample beginning July 1, 1949.
X-540 GR-S	Firestone, Lake Charles	5-31-49	GR-S polymerized at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with Dresinate 731. Shortstopped with dinitro chlorobenzene. Mooney viscosity 57 ± 7.
X-541 GR-S	Firestone, Lake Charles	5-23-49	Same as GR-S-45-AC except for modifier. Shortstopped with hydroquinone. Mooney viscosity 36 ± 4.
X-542 GR-S	Goodrich, Port Neches	7-20-49	GR-S polymerized at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with Dresinate 214. Shortstopped with dinitro chlorobenzene. Stabilized with 1.25% Stalite. Mooney viscosity 55.
X-543 GR-S	Goodyear, Houston	5-24-49	GR-S-20 polymerized to slightly lower conversion.
X-544 GR-S Latex	U. S. Rubber, Naugatuck	6-15-49	Charge ratio 70 parts butadiene and 30 parts styrene polymerized at 50°F maximum with cumene hydroperoxide recipe emulsified with potassium soap. Shortstopped with YNA (dimethyl ammonium dimethyl dithiocarbamate). Total solids 49.5% maximum.
X-545 GR-S	General, Baytown	7-21-49	A mixture of 50 parts Philblack 0 and 100 parts of GR-S polymerized at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with Dresinate 731 and shortstopped with dinitro chlorobenzene. Mooney viscosity of Latex 37. Stabilized with 1.5% PBNA.
X-546 GR-S	Firestone, Lake Charles	7-22-49	GR-S polymerized at reduced reaction temperature with cumene hydroperoxide activated recipe emulsified with potassium ORR soap and Dresinate 214. Shortstopped with Captax (mercaptobenzothiazole). Mooney viscosity 55. Stabilized with 1.25% PBNA.
X-547 GR-S Latex	U. S. Rubber, Naugatuck	7-20-49	Charge ratio 70 parts butadiene and 30 parts styrene polymerized at 50°F maximum with diisopropyl benzene hydroperoxide activated recipe emulsified with potassium soap. Shortstopped with YNA (dimethyl ammonium dimethyl dithiocarbamate). Total solids 49.5% maximum.

NOTE: The above new polymers are experimental only and the Office of Rubber Reserve, Reconstruction Finance Corporation, does not make any representations or warranties of any kind, expressed or implied, as to the specifications or properties of such experimental polymers, or the results to be obtained from their use.

Airfoam Insoles Available

Goodyear Tire & Rubber Co., Akron, Ohio, has announced that Airfoam insoles, which have been worn by professional ball players for years, all custom-made by their designer, are now in mass production for all people who spend most of their waking hours on their feet. The Remington Products Co., Akron, has placed into production specially designed machinery which enables it to turn out large numbers of the insoles daily; and in all sizes for both men and women's wear. Designed by Dr. Harrison J. Weaver, osteopathic physician for the St. Louis Cardinals, assisted by Dr. Harold E. Claybourne, head of the Department of Orthopedics, Doctors' Hospital, Columbus, Ohio, the insoles actually cushion the feet in their natural contours. In addition, the insoles provide circulation of air around the feet, insulate against heat, cold and moisture, are perspiration absorbent, and can be cleaned easily.

Approve Ohio Rubber Sale

Sale of the Ohio Rubber Co., Willoughby, Ohio, for an estimated $6,000,000 was approved by stockholders of the company on July 28. Control of the company has passed to a group of New York, Philadelphia and St. Louis investors. Stockholders took the action upon the recommendation of the directors. A new company, the Ohio Rubber Co. of Delaware, was formed to take over the firm. No change in the business policies or management will be made. Full details of the transaction were published in our previous issue.

Atlas Opens New Laboratory

The new research laboratories of the Atlas Mineral Products Co. were opened at Mertztown, Penna., on August 21. The new research facilities are dedicated to the late Maximillian F. Wirtz, who founded the concern in 1892.

Peerless Fuel Oil Hose

Development of a new high strength, highly flexible hose for handling fuel oil, aromatic fuels and other petroleum distillates has been announced by the U. S. Rubber Co., Rockefeller Center, New York 20, N. Y. Through the use of a braided rayon reinforcement, the company has been able to produce a hose that combines high strength and greater flexibility with light weight. By constructing the hose of nitrile rubber, the hose is also practical for handling highly aromatic aircraft fuels, the company states. The hose has two stranded, annealed copper wires for the dissipation of static electricity. Its cover is compounded from neoprene to withstand cold temperatures, scuffing and abrasion. The hose will be marketed under the trade name Peerless Fuel Oil-Distillate Hose in sizes of one inch, one and one-quarter inches, and one and one-half inches inside diameter, and in standard lengths.

Consolidate Two DuPont Units

E. I. du Pont de Nemours & Co., Inc., will combine its Plastics and Ammonia Departments into a single Industrial Department effective October 1. The company said that while its interest in the industrial fields served by both departments has been increasing rapidly in recent years and is expected to continue growing, the activities of the two departments have become more and more interrelated and interdependent. For example, a number of important products offered by the Plastics Department are manufactured wholly or in part by the Ammonia Department. The change in organization therefore conforms with the general DuPont administrative policy of having the manufacture and sale of related products conducted under common management in the interest of better service to customers. All product lines now manufactured by both departments will be continued. The consolidated department will be headed by Dr. Emil D. Ries, now general manager of the Ammonia Department, and its headquarters will be in Wilmington, Del.

Quebec Prepares 1949-50 Program

The Quebec Rubber & Plastics Group has announced its program for the 1949-50 season. An opening stag dinner will be held on September 23 at the Queen's Hotel in Montreal, followed by meetings on October 20, November 24, January 12, February 17, March 23, and April 20. The meeting of February 17 will be the Annual Ladies Night, while the season will be concluded with the annual golf tournament on June 16. All meetings other than the special events will be held at the Canadian Legion Hall in Montreal, preceded by an informal get-together at the Jamaica Inn.

Recognize Latex Insulated Wires

The forthcoming 1949 supplement to the 1947 edition of the National Electrical Code will recognize Types RU and RUW latex rubber-insulated conductors in the Nos. 4 and 2 Awg sizes, in addition to Nos. 14-6 sizes currently recognized, according to a recent bulletin of Underwriters' Laboratories, Inc. These products will be judged under the requirements of the June, 1940, edition of the Laboratories' Standard for Rubber-Covered Wires and Cables.

Reduce Tubeless Tire Prices

The B. F. Goodrich Co. has announced that increased production with accompanying reduction in cost has made possible price reductions averaging 8% on its new puncture-sealing tubeless tire. The list price of the 6.50 x 15 standard-pressure tubeless tire, formerly $29.55, is now $26.70. The tubless tire was first introduced in the east, at Pittsburgh, on August 3. Demand is said to still exceed production.

Goodyear Blimp For Navy

Work has been started on a 324-foot blimp, the largest one ever built, the U. S. Navy announced recently. The airship, under construction by the Goodyear Aircraft Corp., at Akron, Ohio, is designed primarily to combat snorkel submarines. It will also be specially equipped for air-sea rescue work. The craft will have a maximum speed of approximately 75 knots, weigh 55,000 pounds and carry a useful load of more than 9,000 pounds. Its 875,000 cubic foot gas bag will be inflated with non-inflammable helium. The M-type World War II blimp, holder of the record for sustained flight at 170 hours, carried only 725,000 cubic feet of gas.

ASTM Sets 1950 Meeting Dates

The 1950 Annual Meeting of the American Society for Testing Materials will be held in Atlantic City, N. J., with the Chalfonte-Haddon Hall again used as convention headquarters. This will be the 53rd meeting and the ninth exhibit of testing apparatus and related equipment. The 1950 Spring Meeting and A.S.T.M. Committee Week will be held in Pittsburgh during the week of February 27, with headquarters at the William Penn Hotel.

Booklet on Franklin Institute

A new brochure describing the greatly expanded facilities of the research and development laboratories of the Franklin Institute has been made available. The booklet indicates some of the investigations for which these laboratories are equipped, including high polymer research. Copies of the booklet may be secured by writing to the Administration Division, Franklin Institute, Benjamin Franklin Parkway and 20th St., Philadelphia 3, Penna.

Tool Engineers to Meet

One of the most extensive technical programs in the society's history is planned for the 17th semi-annual meeting of the American Society of Tool Engineers, scheduled to be held at the Mount Royal Hotel in Montreal, October 27-29. The majority of the sessions will deal primarily with methods by which tool engineers can reduce costs.

Sells Peerless Glove Co.

The Pioneer Rubber Co., Willard, Ohio, has sold all of the outstanding capital stock of the Peerless Glove Co., Grand Haven, Mich., to E. D. Ginter, who has managed the company for the past four years. Peerless Glove, which Pioneer Rubber bought in 1945, manufactures cotton gloves only.

Carbexport To Meet FTC Ruling

Carbon Black Export, Inc., New York, N. Y., has advised the Federal Trade Commission of its intentions to comply fully with the FTC recommendations of July 15 that it discontinue certain practices alleged to be in violation of the anti-trust laws. Carbon Black Export, known as Carbexport, was organized under the Webb-Pomerene Law for the purpose of exporting carbon black. The report of the association, filed in accordance with the commission's order that it state within thirty days whether it elected to comply with the recommendations, is now before the commissioners and is expected to be acted upon shortly. Text of the report was not available for publication in advance of the commission's action, but it was understood that the association denied certain of the allegations of the commission but expressed its willingness to cooperate fully with the recommendations. Complete case details were reported upon in the August issue of RUBBER AGE.

Rheology Society to Meet

The twentieth annual meeting of the Society of Rheology will be held at the Hotel New Yorker in New York City on November 4 and 5. A total of eighteen technical papers will be presented including one on "Flow Curves for Concentrated GR-S Solutions," by A. B. Bestul and H. V. Belcher of the National Bureau of Standards and another on "The Rheological Properties of Synthetic Latices", by B. P. Madow and S. H. Marow of the Industrial Rayon Corp. and the Case Institute of Technology, respectively. Nonmembers are welcome at the meeting.

Modicol S Emulsion Stabilizer

A unique surface active agent of fatty nucleus is being marketed by the Nopco Chemical Co., Harrison, N. J., under the name of Modicol S. Use of small percentages of this stabilizer is said to insure an unusual degree of mechanical stability to natural and synthetic rubber latices. Similar percentages of this stabilizer protect GR-S and neoprene against acid coagulation. Modicol S is effective over a wide range of pH, has a high degree of permanency of effect and maintains the viscosity of the latex system.

Huber Names Chicago Agent

J. M. Huber Corp., New York, N. Y., has appointed the Edward J. Lewis Co., 9 South Clinton St., Chicago, Ill., as its representative in the Chicago area. Sales of Huber channel and furnace carbon blacks, clays and rubber chemicals in Illinois and Southern Wisconsin will be under the direction of Herbert Lewis, who has just returned from a tour of the Huber plants and research laboratories at Borger, Texas; Langley, S. C.; and Huber, Ga. Mr. Lewis is a chemical engineering graduate of Purdue University.

Four New Ferro Stabilizers

Ferro Chemical Corp., Bedford, Ohio, has announced the commercial availability of four new stabilizers. The products are Stabilizer 100, 301, 361, and 541. Stabilizer 100 is a barium salt of 2-ethyl hexoic acid, and is said to be of distinct advantage where minimum odor and non-yellowing are desired. Stabilizer 301 is a basic lead octoate, and offers protection during periods of high temperature and thus accelerated breakdown; whereas the silicate type tends to accept HCl at a moderate rate over a longer period, the soap type of lead compounds appear to accept HCl much more rapidly and thus are best for periods of peak evolution. Stabilizer 361 is a lead organo-silicate of a composition such as to give optimum wetting and dispersability in typical vinyl formulations. It compares favorably with ordinary lead silicates so far as opacity and the ability to contribute heat and light stability to plastics. Stabilizer 541, an organo-phosphate, combines the advantages of both the organic and inorganic types of phosphate. This material is an excellent heat as well as light stabilizer. Furthermore, whereas the usual inorganic phosphates are difficult to incorporate into composition because of poor grinding, this material is a soft solid which, with little work, or on slight elevation of temperature, is readily reduced to a liquid material and is thus readily incorporated.

Plastilock Synthetic Adhesive

B. F. Goodrich Co. in conjunction with the General Motors Corp. has developed a new adhesive with amazing strength and a multitude of industrial and household uses. Named Plastilock, the adhesive is compounded with synthetic rubber manufactured by Goodrich. The first commercial application has been made by Chevrolet for bonding linings to truck and passenger car brakeshoes entirely eliminating rivets and substantially increasing brake life and efficiency. The adhesive is said to have twice the safety of rivets at the same time doubling the life of a car's brakes. In a recent test, the new material, applied to a standard automobile brake shoe, was used to lift and suspend a 3000 pound automobile.

Chemical Engineers to Meet

The 1949 annual National Meeting of the American Institute of Chemical Engineers will be held in Pittsburgh, Pa., December 4-7 inclusive, with headquarters at the William Penn Hotel. A varied and interesting program of technical papers has been arranged, along with several technical symposia on timely subjects of special interest to chemical engineers and technical men in general. The symposia will include: Panel Discussions on the Present Status of Professional Legislation, Corporation Training of Young Engineers; Industrial Waste Disposal; Atomic Energy; Vapor-Liquid Equilibria.

Handles New England Sales

H. Logan Lawrence

H. Logan Lawrence has been appointed technical sales representative for the New England area of the DuPont Rubber Chemicals Division. He will make his headquarters in Boston. Mr. Lawrence replaces George W. Smith, who has been made assistant manager of the Boston office of the company's Organic Chemicals Department. Mr. Lawrence came with DuPont's Engineering Department in 1934 after graduation from the University of Missouri with a B. S. degree in chemical engineering. In 1936, he joined the Rubber Chemicals Division where he served as a member of the Rubber Laboratory staff and as a sales development engineer in the main office. In 1946, he was placed in charge of export sales of rubber chemicals and neoprene, which position he now leaves to take up his duties in New England.

Rubber Insulated Clips

Rubber insulated clips, clamps, and fasteners have been standardized by the Automotive Rubber Co., Inc., 8601 Epworth Boulevard, Detroit 4, Mich. These rubber insulated products are designed to prevent slipping, chaffing, cutting and rattling in the securing of wire, loom, tube, pipe, cable, rod, etc. They are available in a variety of shapes and each in a wide range of sizes. Exposed metal ends can be parkerized, zinc plated, cadmium plated, lacquered or enameled to suit the customers' needs. Special shapes and sizes are available to specification.

Raybestos-Manhattan, Inc.

First Half: Net profit of $830,849, which is equal to $1.32 a share, compared with $1,135,456, or $1.80 a share, last year.

General Cable Corp.

First Half: Net income of $1,159,905, compared with a net income of $2,180,047 for the first half of the previous year.

Geon Polyblend 500 x 479

A new Geon Polyblend, manufactured by the B. F. Goodrich Chemical Co., Cleveland 15, Ohio, may be converted into calendered film and used in rubber manufacturing plants as interlining material replacing Holland cloth and like materials. Designated as Geon Polyblend 500 x 479, the new product is a colloidal combination of vinyl resin and Hycar nitrile rubber. The non-migratory Hycar rubber plasticizer contained in Geon Polyblend is said to make the film ideal for protecting the surface of in-process green stocks. Furnished in dry powder form, the polyblend may be readily used in both mill and Banbury mixing operations. The powdered 500 x 479 can be stabilized with standard vinyl stabilizers and lubricants and fluxed on a hot mill (8 minutes roll temperature 280 to 300° F.) or in a Banbury (drop at maximum power load or stock temperature at 330° F.). The material can be calendered at 6 to 8 mils thickness with a roll temperature around 275° F. When a softer film is required, Geon Polyblend 500 × 479 may be blended with another polyblend, 500 × 503, to furnish a range of hardness value between the two materials. Films made from Geon Polyblend 500 × 479 have a tensile strength of 4100 psi, elongation of 280%, and tear strength of 900 pounds to the inch.

Nerva-Plast Cold Setting Cement

Rubber & Plastics Compound Co., Inc., 30 Rockefeller Plaza, New York 20, N. Y., has developed a weather-proofing and water-proofing cement called Nerva-Plast. The material is cold setting and is said to adhere to almost any surface. Nerva-Plast is applied by trowel, brush or spray. It stays flexible enough for application at temperatures as low as —35° F. The company says it is particularly suited for work on flashings, parapets, sidewalls, and chimneys, where the use of hot cement is impractical. Applications of the product on a warm inner wall of a room will keep out moisture and prevent vapor condensation. One gallon of the material will cover approximately 75 square feet.

Goodyear Dual Welding Hose

A new type of dual welding hose made in two colors of vinyl plastic has been designed by the Goodyear Tire and Rubber Co., Akron, Ohio. The two hose tubes, one bright green, the other vivid red, have been "welded" together by applying heat and pressure to the plastic covers, thus forming a two-way unit that handles as easily as one hose. It is constructed of rayon braid to give it high burst pressure and extreme flexibility. The new hose has no webbing or excess material which would require extra preparation for installing couplings, the company states. Oil resistant, the new hose will not support fire and its resistance to abrasion is said to be superior to ordinary rubber-covered welding hose.

FRENCH PLANTERS AGREE ON STANDARDS FOR MARKING CRUDE RUBBER

According to the September, 1949, issue of *Revue Generale du Caoutchouc,* Indochinese rubber growers have decided on standards for the marking of crude rubber. In the course of recent talks, the Syndicat des Planteurs de Caoutchouc d' Indochine and the Union des Planteurs de Caoutchouc have agreed on the principle of marking current commercial crude rubber types according to their intrinsic values.

It is well known that the commercial grading of rubber is based almost completely on its external appearance, and this has been an object of strong criticism. This method is said to permit the sale of rubber which does not have the best mechanical properties at a high price, while rubber having excellent properties may be sold for less because of its poor appearance.

In order to impart the significance of a rubber marking system, the article defines what is meant by "specified" and "special" rubber types. A *specified rubber* is a rubber of current standard which offers no particular properties but which bears marks which enable the user to recognize the essential properties of the lot, i. e., plasticity and rate of vulcanization. A *special rubber,* on the other hand, presents with regularity and with a small degree of variability, definite properties.

There are two types of special rubbers, those that are simply homogeneous and those with particular properties. The homogeneous types have properties which are not very different from the average types of current rubbers, but their variability is considerably reduced. Special rubbers with particular properties have one or several properties that are quite different from the average, also with small variability.

Basic Marking Principles Adopted

Two basic criteria have been considered for grading the raw rubber—Mooney viscosity and rate of vulcanization. The Mooney viscosity is measured on the unmasticated rubber and thus provides a ready index for the milling time required to reach a desired plasticity. The choice of Mooney viscosity as a criterion of plasticity was based on the simplicity of the process and the good reproducibility of the test.

Most well equipped laboratories have a Mooney viscometer. It is also very easy to make comparison tables with the results obtained with compression plastometers of the Williams, Goodrich, Defo, or other types. The correlation between Mooney viscosity and these measurements is proportionally better in that the plasticity is greater. The French Rubber Institute intends to publish results of a study made on this question, and to publish recommendations for the use of an improved test of plasticity for raw rubber which will be feasible with compression plastometers of the current type.

According to the article, raw rubbers are divided into three groups of Mooney viscosity. The limits adopted are the following: Not very plastic rubber, that is, rubber with a Mooney viscosity of more than 87° C.—to be marked with a cross (X); Fairly plastic rubber, or rubber with a Mooney viscosity between 73 and 87° C.—to be marked with a circle (O); Relatively plastic rubber, rubber with a viscosity lower than 73° C.—to be marked with a line (—). The choice of these marks has a mnemonic significance. The cross (X) means more Mooney degrees, the line (—) less Mooney degrees, and the circle (O) indicates the intermediary position.

Marking Vulcanization Rates

The principle upon which the operation is based in this case is to vulcanize during a definite time and to measure the modulus. The statistical analysis of numerous tests previously made has established that this method will give gradings which, with few exceptions, will coincide perfectly with the grading obtained by obtaining the optimum time of vulcanization of the same mix. It is important to point out that this is in no way a measure of the modulus at the optimum of vulcanization. The modulus at 40 minutes may, according to the rate of vulcanization, change considerably, while the modulus corresponding to the optimum time will generally give fewer differences.

The rate of vulcanization is determined by a simple test, following the procedure outlined in French Specification T. 43-001. A typical mix is made, the composition of which is identical to that recommended by the Crude Rubber Committee of the Division of Rubber Chemistry, A. C. S., namely:

Rubber	100.0
Stearic Acid	0.5
Zinc Oxide	6.0
Sulfur	3.5
Mercaptobenzothiazole	0.5

With this mix, samples are vulcanized at a temperature of 127°C for 40 minutes. These operations are always based upon French specifications, except for temperature. The French specify a vulcanization temperature of 125° C. However, a temperature of 127° C. has been adopted in an attempt to conform to practices in the United States. Type A Schopper rings are used for the modulus test.

The measure of the modulus at 600% elongation is made on these rings (charge in kg/cm² corresponding to an elongation of 600%). If this modulus is inferior to 30 kg/cm², the corresponding rubber will be said to be slow vulcanizing. An appropriate coloring system has been adopted to cover this phase. The color red indicates slow vulcanization, yellow indicates medium vulcanization rates, and blue indicates stock with fast vulcanizing properties.

The signs—cross, circle, or line—corresponding to plasticity are placed on the bale in the color corresponding to the rate of vulcanization. These marks will be added to the usual commercial gradings, and will in no way interfere with them. There will remain on the market the designations for smoked sheet, brown crepes, etc., but the new markings will be a further indication of the rubber's intrinsic qualities.

The French are of the opinion that a chief advantage in the use of specified rubbers is the avoidance of the inconveniences caused by the variability of rubber. Wastes caused by bad vulcanization, calendering and extruding may partially be avoided when a basic knowledge of the properties of the rubber being handled are known beforehand. Because of the increased regularity of the stocks greater economies may be effected. Reduction of stocks and reduced milling times are other advantages claimed for this system.

It will also be seen that for some purposes, certain kinds of rubber are better than others. For a rapid molding of small goods, blue rubbers may be required, for they will allow a saving in the quantities of accelerator necessary for a determined vulcanization. As certain types of rubbers manifest their popularity, rubber producers will be able to direct production to this or that specific type. This will mark an important step in the stabilization of the natural rubber market, the article concludes.

Report on Wollastonite

A special report on wollastonite, a new industrial mineral with a wide range of possibilities for incorporation in commercial and industrial products, has been made available by the Office of Technical Services of the U. S. Department of Commerce, Washington, D. C. The report presents a series of prospective uses of the new material as indicated by two years of study. Possible applications investigated included rubber, asphalt tile, ceramics, chemicals and abrasive wheel materials. Copies of the report are available at $2.50 each.

United Carbon Co.

First Half: Net income of $1,353,303, which is equal to $1.70 each on 795,770 capital shares, against $1,568,806, or $1.97 each on an equal number of shares, for the first half of the previous year.

Arlon, a resilient plastic asphalt tile, has been developed and is being marketed by the Armstrong Cork Co. The new tile is said to combine a completely different monochromatic concept of coloring with high resistance to oils, greases, fats, alkali and wear.

A special bulletin describing Paracril AMS 3228-B Compound has been issued by the Enjay Company. Copies are available on request to the company or any district office.

A new external house organ under the title of "Precisionomics" has been launched by the Precision Scientific Co., Chicago 47, Ill. Present plans call for six issues a year, one every other month.

Rubber Red Book Available

Copies of the 1949 Rubber Red Book, the complete directory of the rubber manufacturing industry in the United States and Canada which is published every other year by RUBBER AGE, are now available. Larger by some 100 pages than the previous edition, the latest issue furnishes data on 1,057 rubber manufacturers in the United States and 76 in Canada. In addition, comprehensive data is contained on rubber machinery and equipment, accessories and fittings, rubber chemicals and compounding ingredients, fabrics and textiles, natural rubber and related materials, synthetic rubber and rubber-like materials, reclaimed rubber, scrap rubber, rubber latex, rubber derivatives, miscellaneous products and services, consulting technologists, branch offices and sales agents, trade and technical organizations, and technical journals. A new section is devoted to "Educational Courses in Rubber Chemistry and Technology." The Who's Who Section, one of the main features of the directory, is considerably larger than that of the 1947 number. Following its standard practice, the publishers have supplied at least one complimentary copy to every rubber factory in the United States and Canada. Additional copies are available at $5.00 each (plus 2% sales tax in the New York area) from RUBBER AGE, 250 West 57th St., New York 19, N. Y.

U. S. Rubber Adds to Belt Line

U. S. Rubber Co., New York 20, N. Y., has added round endless belts to its U. S. Rainbow line for use on drills, high speed hammers, tappers, saws, sewing machines, valve refacers, wood working tools and other small machinery applications. The belts are of round cross section design built without a splice. Cord pulling members keep stretch at a minimum. Bias cut jackets protect the inner structure and insure flexibility. Endless round belts are recommended for quarter turn, mule, serpentine, cross drives, and many other special wheel turning applications. They can easily be shifted on step-up pulleys for speed changes, the company said. The belts are available in sizes ranging from 3/16-inch to 1/2-inch belt diameter and from 6⅞ inches to 156⅜ inches inside circumference.

Thiokol Shifts Elkton Division

The operations of the Elkton Division of the Thiokol Corp., Trenton, N. J., have been transferred from Elkton, Maryland, to the Rocket Research and Development Center, Redstone Arsenal, Huntsville, Ala. The company is engaged in research and development work on solid fuels for rocket and jet assist units and is working under contracts to the United States Army Ordnance. The new location is said to have many advantages and affords facilities and space not available at Elkton. The operations are now being conducted in wholly-owned Government facilities. The division is now known as the Redstone Division of the Thiokol Corp., and is under the direction of Dr. W. M. Mebane.

Joins Johnstone Organization

Marvin K. Larson

Marvin K. Larson, a graduate of the Illinois Institute of Technology who has been in sales work for the past three years, has joined the sales staff of Douglas P. Johnstone. The Johnstone organization, which has its headquarters at 2724 West Lawrence Ave., Chicago 25, Ill., is Chicago district representative for T. A. Desmond & Co., General Latex & Chemical Corp., and the Harwick Standard Chemical Co. Mr. Larson has been selling liquid latex formulations and resin emulsions and has many friends in the central western factories.

Additional Hydrocarbon Samples

The National Bureau of Standards and the American Petroleum Institute, through a cooperative program begun in 1943, have prepared a total of 162 compounds now available as NBS standard samples of hydrocarbons for calibrating analytical instruments and apparatus in the research, development and analytical laboratories of the rubber, petroleum, chemical and allied industries. The most recent additions to the series of compounds announced by the Bureau include the following: n-Hexadecane; cis-3-Hexene; 1, 2-Pentadiene; 2, 3-Dimethyl-1, 3-butadiene; 1-Methyl-4-isopropyl-benzene, and 1-Methyl-E-tert-butyl-benzene.

Data on Wire Insulation

In the first quarter of 1949, chemical rubbers supplied 77.8% of the new rubber used in insulated wires and cables, compared with 75.2% in the calendar year of 1948, according to a recent issue of the Rubber Industry Report. Neoprene, for the first time, became the principal material used, representing 39% of new rubber, while GR-S declined to 38%. Use of natural rubber fell from 24.8% in 1948 to 22.2% in the 1949 quarter, and the ratio of reclaim to new rubber dropped from 7.5 to 5.1%.

Celebrate 100th Anniversary

The Hoggson & Pettis Manufacturing Co., of New Haven, Conn., manufacturers of molds and tools for the rubber manufacturing industry, is currently celebrating its 100th anniversary. The company had its start about the time Charles Goodyear was making his remarkable discoveries. It was founded in New Haven by Samuel J. Hoggson, a Scotch-Irishman, who came to this country from North Ireland where he had learned his trade as engraver, letter cutter and die sinker. The services of the new company were soon very much in demand by the infant rubber industry and the firm takes pride in the fact that in the past 100 years it has furnished molds, dies or tools for practically every factory for the manufacture of rubber goods which has been opened in the United States and Canada. One customer, the Goodyear Rubber Co. of Middletown, Conn., has been on the company's books for some 75 years. In 1879 Mr. Hoggson took as his partner George C. Pettis and the name was changed to Hoggson & Pettis. A further change was made in 1882 when the company was incorporated under its present name, the Hoggson & Pettis Manufacturing Co. Present officers include George P. Stephan, Jr., president, and Carl A. Stephan, secretary-treasurer.

$125,000 Expansion Program

Plastic & Rubber Products, Inc., Dayton, Ohio, has announced a $125,000 expansion program calling for additions to plant and offices. The program calls for a 16 foot by 30 foot two-story addition to the general office and a 40 foot by 60 foot two-story plant addition complete with the latest type of electrically heated rubber presses. Work on the buildings and the installation of the machinery is to be completed by December 1. In the past five years the firm has grown from a force of 45 employees with a Dayton sales office to 150 employees with sales offices in the principal cities of the United States. In accordance with expansion plans, Robert E. Allen, vice-president of the firm who has had charge of the Chicago office for the past four years, has been transferred to the Dayton headquarters.

Personnel Changes at DuPont

Dr. George E. Holbrook, general superintendent of development at the Chambers Works of E. I. du Pont de Nemours & Co., Inc., at Deepwater Point, N. J., has been named assistant director of the Technical Division of the Organic Chemicals Department, with headquarters at Wilmington, Del. Dr. Holbrook was succeeded by Dr. John E. Cole, formerly general assistant production superintendent at the plant. In other changes in the department's organization, Edgar W. Thompson, production manager for the Rubber Chemicals Division, was named manager of the company's neoprene plant at Louisville, Ky., while Emory F. Ridlon, former manager of the plant, was placed in charge of tetraethyl lead manufacture at the Chambers Works.

FINANCIAL NEWS

GOODYEAR INCOME AT $8,133,358 FOR FIRST SIX MONTHS OF 1949

Operations of the Goodyear Tire & Rubber Company for the half year ended June 30 resulted in consolidated net sales of $311,823,235 and net income of $8,133,358, equivalent to $3.24 per share of common stock outstanding. In reporting the results following a meeting of the board of directors recently, Chairman P. W. Litchfield said that the company's business continues in high volume but at substantially lower profit margins. For the corresponding period last year, consolidated net sales were $346,079,544 on which net income of $14,191,648, equivalent to $6.16 per share of common stock, was realized.

Foreign income for the half year, consolidated in the income account, amounted to $4,400,000, on account of which dividends totaling $1,623,000 were received during the period. The company's equity in fixed and current assets outside the United States as of June 30 amounted to $52,595,000, in respect of which there has been provided in prior years a reserve of $17,070,000. During the six months, losses arising from the devaluation of foreign currencies amounted to $2,728,000, which has been charged against this reserve. In view of the balance now carried, no further addition was made to the reserve for foreign investments at this time pending the determination of the situation at the year-end.

Goodyear's working capital now amounts to $256,200,000 against $249,600,000 a year ago. The current asset ratio of 6 to 1 compares with a ratio of 5.85 to 1 on June 30 last year. Crude rubber on hand, on commitment, and in finished product, has been written down to the June 30th market, Mr. Litchfield reported.

Armstrong Cork Co.

First Half: Net profit of $4,425,726, which is equal to $2.80 per common share, compared with $6,386,776, before a $1,060,000 replacement reserve, or $4.21 a common share for the first half of the previous year. Net sales for the first six months of 1949 amounted to $81,612,391, against $87,496,711 in the first half of 1948. Current assets as of June 30, 1949, amounted to $50,582,109, and current liabilities totaled $15,091,630, against $50,605,609 and $18,213,039, respectively, as of June 30, 1948.

Anaconda Wire & Cable Co.

First Half: Net income of $1,722,383, which is equal to $2.04 each on 843,962 capital shares outstanding, compared with $3,357,096, or $3.98 each on 843,962 capital shares for the first half of 1948. Net profit for the March quarter of this year was $1,381,370, which is equal to $1.63 a share, against $1,833,469, or $2.17 a share, in the March quarter of 1948.

Seiberling Rubber Co.

First Half: Net loss of $247,525, which is equal to a loss of $1.22 per common share, compared with a net profit of $299,732, or 59 cents per share, for the first half of the previous year. Net sales for the period ended June 30, 1949, totaled $11,969,831, against $14,138,712 for the corresponding half of 1948. The consolidated balance sheet at the end of the six-month 1949 period revealed total current assets of $12,478,490, and total current liabilities of $4,184,036. The net loss shown for the first half of 1949 was attributed to a sharp reduction in sales of replacement tires and price-cutting with no corresponding reduction of manufacturing costs.

Minnesota Mining & Mfg. Co.

First Half: Net profit of $6,330,227, which is equal to $3.11 each on 1,972,845 common shares, against $5,524,260, or $2.83 each on 1,951,530 common shares outstanding, for the first half of 1948. Net sales for the first six months of 1949 amounted to $54,552,850, compared with net sales of $51,639,752 for the first six months of the preceding year. Net profit for the second quarter of this year amounted to $3,114,978, which is equal to $1.53 a share, against $2,907,211, or $1.44 a share, for the same three months the year before. Net sales for the second quarter of 1949 totaled $27,667,435, compared with $26,897,270 for the quarter ended June 30, 1948.

B. F. Goodrich Co.

First Half: Net income of $8,909,635, after providing $2,000,000 for increased replacement cost of facilities, which is equal to $6.02 a common share and compares with $11,023,446, after a similar $2,000,000 provision, or $7.64 a common share, in the corresponding period last year. Consolidated net sales for the first half of 1949 amounted to $192,149,550, against $197,688,828 reported for the first half of 1948. The consolidated balance sheet as of June 30, 1949, showed current assets of $179,816,547 and current liabilities of $25,160,992, compared with $176,510,067 and $35,569,054, respectively, on June 30, 1948.

New Jersey Zinc Co.

First Half: Net profit of $3,223,638, which is equal to $1.65 a share, against $4,176,095, or $2.13 a share, earned in the corresponding half of 1948. For the quarter ended with June, 1949, the net profit was $463,454, or 24 cents a share, in contrast to $2,351,187, or $1.20 a share in the second quarter a year ago. Company officials attributed the second quarter decline to the precipitate drop in the price of slab zinc.

Columbian Carbon Co.

First Half: Net income of $3,618,092, which is equal to $2.24 each on 1,612,218 shares of no par capital stock outstanding, compared with $3,509,540, or $2.18 a share, for the first half of 1948. Included in the 1949 figure is $1,906,372 extraordinary income, which compares with $686,016 extraordinary income for the first half of 1948. Sales for the first six months of this year amounted to $19,238,186, a decline of $1,722,832 or 8% from the same period a year ago.

O'Sullivan Rubber Corp.

First Half: Net income of $14,555, which is equal to 42 cents each on 35,000 preferred shares, against $26,547, or 3 cents a share on 275,000 common shares for the first half of 1948. Net sales for the period ended June 30, 1949, totaled $1,692,254, against $1,372,458 for the first half of the previous year.

General Tire & Rubber Co.

Six Months Ended May 31: Net profit of $474,758, which is equal to 41 cents a share, compared with $1,713,367, or $2.46 a share, in the corresponding period a year ago. Sales for the 1949 period amounted to $45,161,156, against $46,782,583 in the six-month period ended May 31, 1948.

Thermoid Company

First Half: Net income of $419,578, which is equal to 47 cents each on 752,366 common shares, against $570,065, or 70 cents each on 716,588 shares last year. Sales for the 1949 period amounted to $11,219,468, compared with $12,656,326 for the period ended June 30, 1948.

Sheller Manufacturing Corp.

First Half: Net profit of $1,715,332, which is equal to $3.07 per share on 553,340 common shares outstanding, compared with $1,232,454, or $2.20 per share, on an equal number of common shares, for the first half of 1948.

Union Asbestos & Rubber Co.

First Half: Net profit of $594,017, which is equal to $1.20 a share on net sales of $5,387,034, compared with $767,226, or $1.55 a share on net sales of $6,853,272, for the first half of 1948.

Intercontinental Rubber Co.

First Half: Net loss of $277,468, compared with a net loss of $122,708 for the corresponding period of 1948. Figures include totals for subsidiary companies.

Brown Rubber Company

First Half: Net profit of $700,657, which is equal to $2.79 a share, compared with $428,110, or $1.70 a share, for the corresponding period last year.

PRODUCTION OF CARBON BLACK FALLS IN FIRST HALF OF 1949

According to the U. S. Bureau of Mines, production of carbon black in the first six months of 1949 totaled 627,028,000 pounds, including 323,204,000 pounds of channel and 303,824,000 pounds of furnace black. These figures compare with 657,636,000 pounds of black produced in the first half of 1948, of which 335,863,000 pounds were of the channel type and 321,773,000 pounds were furnace black.

Shipments of black during the first half of 1949 totaled 564,703,000 pounds, against 627,872,000 shipped in the first half of the preceding year. In the 1949 period, 268,665,000 pounds of channel type and 296,038,000 pounds of furnace type were shipped, compared with 331,451,000 pounds and 296,421,000 pounds, respectively, shipped in the first half of 1948.

Producers' stocks of channel black at the end of June, 1949, amounted to 80,663,000 pounds, and furnace black to 97,982,000 pounds for a total of 178,645,000 pounds. At the end of June, 1948, a total of 102,168,000 pounds were on hand, of which 11,368,000 were channel type and 90,800,000 pounds were of the furnace type.

To Produce Rubber Hydrochloride

According to reports from Holland, the Rubber Stichting (Rubber Foundation) at Delft has developed a new type of rubber hydrochloride film based on natural rubber and hydrochloric acid. Called "Rulahyde," the new film will be manufactured by various companies under a royalty arrangement. The Stork Co. at Hengelo, Holland, has already been granted a license for its manufacture. The reports indicate that the process and equipment required are much simpler than those used in the manufacture of Pliofilm.

Forms New Chemical Division

A chemical division has been established by the Reynolds Metals Co. to handle its specialties for the chemical industry. I. P. Macauley, vice-president, with headquarters at 19 East 47th St., New York, N. Y., is head of the new division. Products currently being produced include aluminum hydrate, calcined alumina, and R. R. aluminum. The latter consists of small, specially prepared particles of high purity aluminum for use in chemical reactions.

To Close Argentinian Plant

The Firestone Tire & Rubber Co. recently announced that its plant in Buenos Aires, Argentina, would be closed due to lack of raw materials usually imported from the United States. Restrictions on imports of many United States articles because of current dollar shortages made the closing necessary, company officials stated. About 1,000 persons will be left idle by the closing. They include 800 factory and 200 office workers.

ADDITIONAL CHANGES ANNOUNCED BY THE SCHRADER ORGANIZATION

R. Rounds G. W. Gross H. F. Walters

As announced in our previous issue, several additional changes in its executive organization have been made by the A. Schrader's Son Division of the Scovill Manufacturing Co., Brooklyn 17, N. Y. These included the appointment of George W. Gross as works manager, Robert Rounds as manufacturing superintendent, and H. F. Walters as assistant production manager. The photographs accompanying the announcement were correct, but the captions beneath the photographs of Mr. Walters and Mr. Rounds were transposed. Accordingly, we are reproducing the photographs above, with the identifications in proper position and regret the initial error.

H-511 Ubabond Synthetic Cement

H-511 Ubabond, a synthetic rubber cement developed by the Union Bay State Chemical Co., Cambridge, Mass., is said to make possible the pre-cementing of many materials. Described as "magnetic" in its behavior, the pre-cemented surfaces can be joined together at a later time, on an assembly line or even after shipping to point of use, without loss of adhesion efficiency. Upon application, the adhesive dries to a non-tacky condition after a period of from 15 to 30 minutes at room temperature. When the pre-cemented surfaces are to be joined together, reactivation can be accomplished easily and quickly by heating the "dead" surfaces under infra-red, steam or dry heat, or by brushing a solvent on the pre-cemented surfaces.

Wright Rubber Tile Plant

Wright Manufacturing Co. recently opened its new plant in Houston, Texas, for the manufacture of rubber tile. The plant, said to be the only installation in the world specifically designed for the production of rubber tile, was constructed at a cost of $3,000,000. Approximately 100 invited guests were present at the opening day ceremonies, including Chamber of Commerce officials, bankers and political notables of the state of Texas.

Named Golden Bear Agent

Akron Chemical Co., Akron, Ohio, has been appointed sales agent for the Golden Bear Oil Co., Oildale, Calif., for the sale of rubber chemicals. Akron Chemical will handle the sale of these products in the states of Ohio, Indiana, Michigan, Alabama, Oklahoma and Tennessee.

U. S. Rubber Cuts Dividends

Directors of the U. S. Rubber Co. have cut in half the quarterly dividend on the company's common stock. The board declared a dividend of 50 cents a share on the common from earned surplus as of December 31, 1948. The disbursement, which compares with dividends of $1 each on June 18 and March 10, will be made on September 10. The board, however, voted the regular dividend of $2 a share on the company's 8% non-cumulative first preferred stock, payable on September 10. This declaration, it was announced, was made from net earnings of the company during 1948.

Ceylon Asks Rubber Plan

The Ceylon Government has asked Sir Stafford Cripps, British Chancellor of the Exchequer, to place before the United States Government suggestions for insuring a reasonable, stable rubber price. Ceylon's Finance Minister disclosed that the Ceylon Government was reducing imports from the dollar areas 25% from the 1948 level by standstill measures and revising imports. He said a cabinet committee had been appointed to submit proposals for controlling imports and expenditures and increasing home production.

Tamms Silica Changes Name

Because of expansion of business interests and a constantly increasing variety of products, the Tamms Silica Co., 228 North La Salle St., Chicago, Ill., has incorporated under the new name of Tamms Industries, Inc. The management and board of directors felt that this name signifies the wider range of manufacturing activities in which the company is engaged today. General offices remain at the Chicago address.

LOS ANGELES NEWS

A major expansion move including the establishment of three branch offices and shifts in top executive personnel has been announced by American Latex Products Corp., 3341 W. El Segundo Boulevard, Hawthorne, Calif. An office has been established at 2000 N. Second St., Philadelphia, Penna., primarily for covering and warehousing the company's new line of office chair cushions with Goodyear Airfoam fillers. The Philadelphia office is managed by J. F. Cody. Michael Dougan has been placed in charge of the new Chicago, Ill., office at 4306 W. Armitage St., and the Denver, Colo., branch at 1938 Broadway is headed by Ray Haley. At the head office, Walter Clarke has been named vice-president in charge of production. T. Patrick Dougan, formerly head of the company's Moltex division, has been appointed vice-president in charge of sales, and Harry Gerstin has been promoted from head of the Adhesives Division to sales manager. No changes have been made at the company's San Francisco and Seattle branch offices.

Lawrence T. "Tom" Greiner has been appointed by the B. F. Goodrich Co. as manager of its Pacific Coast division of the Replacement Tire Sales division. He succeeds Frank E. Titus, who recently retired after 42 years of service with the company. Mr. Greiner has been manager of the southwestern division of replacement sales for the past 30 months, with headquarters in Kansas City. He has already been transferred to Los Angeles.

Contracts for the erection of a new $500,000 plant for the Arrowhead Rubber Co. on an eight-acre site at Downey, Calif., have been placed by the National Motor Bearing Co. Arrowhead is a subsidiary of National Motor Bearing. Arrowhead's present plant in the industrial section of Los Angeles will be abandoned and all operations transferred to the Downey plant when completed. The new plant will be housed in two structures, with an aggregate area in excess of 62,000 square feet.

Tubeless tires are now being manufactured in the local plant of the B. F. Goodrich Co., according to a recent company announcement. The new tire is also being made at the company's Akron, Miami and Tuscaloosa plants, and is being sold in five districts, namely, Cincinnati, Indianapolis, Jacksonville, Minneapolis and Pittsburgh. The tubeless tires will be offered in the Pacific Coast region as soon as inventories are built up.

Blue Star Mines, Ltd., has occupied its new office and warehouse at 665 South Anderson St., Los Angeles 23, Calif. The new phone number is ANgelus 2-9000. The move is expected to enable the company to provide better service for its customers.

Appoints Distributing Agents

Harry T. Campell Sons' Corp., Towson, Baltimore 4, Md., has announced the appointment of new broker distributors for the sale of Camelwite (calcium carbonate) and Camel Carb (whiting) to the rubber, paint, paper, varnish and allied industries. The new Campbell distributors are: Jensen and McClelland, 510 N. Dearborn St., Chicago, Ill.; Baker & Collinson, 12000 Mt. Elliott, Detroit, Mich.; Smead & Small, 1630 Hanna Building, Cleveland, Ohio; Worum Chemical Co., 2130 Kasota Avenue, St. Paul, Minn.; and Pigment and Chemical Co., Ltd., Canada Cement Building, Montreal, Que., Canada. Harry Hoehler of Wayne, Penna., will continue to be the Campbell eastern representative as heretofore.

Japanese Rubber Production

The U. S. Department of Commerce has reported that production of rubber goods in Japan in the first three months of 1949 included 135,934 truck tires and 137,978 truck tubes; 75,167 passenger car and motorcycle tires and 69,741 tubes; 10,234 other vehicle tires and 10,558 tubes; 1,198,475 bicycle tires and 1,363,781 bicycle tubes; and 9,065,290 pairs of rubber footwear. These amounts showed considerable gains over production in the first three months of 1948, when the output was 65,326 truck tires and 68,761 tubes; 34,829 passenger car and motorcycle tires and 38,766 tubes; 3,973 other vehicle tires and 7,064 tubes; 767,786 bicycle tires and 781,188 tubes; and 5,546,581 pairs of rubber footwear.

Offer Beta-Chloropropionitrile

The New Product Development Department of the American Cyanamid Co., Rockefeller Plaza, New York 20, N. Y., has announced that Beta-Chloropropionitrile is now being offered in trial-lot quantities. The reactivity of this material, due to an active halogen and a nitrile group, causes it to result in numerous potentially useful chemicals. Beta-Chloropropionitrile is slightly soluble in water, very soluble in most organic solvents, and has a boiling point of 174 to 176° C. at 752 mm. Hg. A bulletin is available which gives extensive data on this chemical. Either the bulletin or research samples can be obtained upon written request to the company.

Switches to 50-Pound Bags

Good-rite Resin 50, the high styrene-butadiene copolymer manufactured by the B. F. Goodrich Chemical Co., Cleveland 15, Ohio, will no longer be furnished in the standard 200 pounds Lever-Pak drum but in easy handling 50 pound bags for the convenience of the trade. Designed especially as a stiffening agent for rubber stocks, the product is used in shoe soles, floor tiling, and insulation compounds providing such properties as high hardness, low gravity, good flex life and excellent low temperature properties.

CANADIAN NEWS

A capital budget expenditure of $2,250,000 for the current fiscal year was recently approved by the Board of Directors of the Polymer Corporation. The principal expenditure was $1,100,000 for ethane cracking facilities to provide additional ethylene for increased styrene production by Polymer and for the new contract which will become effective this fall with Dow Chemical for 60,000 pounds a day of ethylene for increased production of glycol.

The other major expenditure is $500,000 for completion of the conversion of half of the polymerization plant facilities for the manufacture of low temperature polymers now marketed by the Polymer Corp. under the name of "Krylene."

Among the smaller items provided for in the new budget is one for $70,000 for expansion of the facilities at Polymer's No. 1 pilot plant to provide more technical data on the adaptation to commercial scale production of special processes now under study and to provide large samples of new materials for evaluation by consumers.

Rubber consumption dropped 8% in June from the May figure, according to the Dominion Bureau of Statistics. The June figure was reported at 13,161,000 pounds, compared with 13,218,000 in the preceding month. Natural rubber consumption rose to 7,181,000 pounds in June from 7,154,000 the month before. Reclaim consumption rose to 2,482,000 pounds, against 2,304,000 in May, while consumption of synthetic fell to 3,488,000 pounds from 3,760,000 the month before. The domestic production of synthetic rubber was lower in June, totaling 9,462,000 pounds, compared with 10,176,000 pounds in May. Consumption of reclaim fell to 594,000 in June from 692,000 pounds the month before.

R. A. Lambe, of the Mechanical Goods Division of the Dominion Rubber Co., Ltd., has been transferred to the Northwestern Quebec and Kirkland Lake-Timmins area, assisting the Dominion Rubber representative in that area. Mr. Lambe has been associated with the company since 1946 in the head office at Montreal.

Information concerning Title Products, Ltd., 2020 Bleury St., Montreal, Que., Canada, organized in January, 1948, has recently become available. The firm is engaged in the manufacture of household, industrial and toy rubber goods. Title also offers engineering services and is interested in contacting U. S. manufacturers of cut, dipped and molded products, etc., for Canadian representation. The Canadian company is also interested in reciprocal licensing arrangements for dies, patents, etc.

Pneumatic Conveyor Idlers

Belting engineers of the Goodyear Tire & Rubber Co. have redesigned the impact-cushioning idler for conveyor belts. Pneumatic idlers were first introduced by the company in 1938 and consisted of regular industrial tires, small in cross section and large in overall diameter, which were difficult to adapt to a conveyor structure. The new idler uses airplane tires which will absorb several times the shock of the type formerly used. Most popular size 6.00 x 6 has a small diameter which is easily adapted to conveyor systems. The 36-inch size consists of six 6.00 x 6 tires mounted on a simply constructed stand with the whole unit on one axis rather than offset. The new development offers users of conveyor belts more latitude in size of bulk materials to be handled on a belt conveyor system. Goodyear doesn't intend to manufacture the pneumatic cushioning idler. It was developed as a service to the conveyor belt industry and its customers.

Panaflex BN-1 Plasticizer

Panaflex BN-1, a light-colored plasticizer for synthetic rubber, especially of the butadiene-acrylonitrile type, is currently being marketed by the Pan American Chemicals Division of the Pan American Refining Corp., 122 East 42nd St., New York 17, N. Y. This new hydrocarbon plasticizer is said to completely replace dibutyl phthalate in nitrile rubbers and to produce soft vulcanizates having high tensile, excellent elongation, and very low modulus. Stocks plasticized with this new material are said to possess good aging properties, superior electrical characteristics, and to show good gasoline and oil resistance. Panaflex BN-1 has a specific gravity of 0.9440, a refractive index of 1.553, distillation of 560° to 730° F., and viscosity (ssu @ 100° F.) of 240. It is also reported to offer economies in the use of plasticizers.

Monsanto Develops New Chemical

Monsanto Chemical Co. has announced the development of a new high molecular weight alcohol which is said to have widespread potentialities as a chemical intermediate for use in resins, plastics, protective coatings, adhesives and oil additives. The new material has been given the temporary name "AE-1" until an appropriate trade name can be found. Among other uses, it is recommended by Monsanto as a plasticizer for chlorinated rubber.

Establish Award of Merit

The American Society for Testing Materials has established an Award of Merit to recognize individuals who have rendered distinguished service to the society. Rules and regulations have been set up and it is expected that the Award of Merit Committee will recommend the first awards to the board of directors in 1950. Copies of the rules and regulations were published in the July, 1949, issue of the *ASTM Bulletin*.

NEW CHEMICAL RESEARCH CENTER OPENED BY CARBIDE AND CARBON

One of the most versatile and up-to-date chemical research centers in the world was recently put into operation by the Carbide and Carbon Chemicals Corporation. This new organic chemical research center, an air view of which is reproduced above, is located on a 140-acre tract near the company's South Charleston, West Va., plant. When finally completed, it will be the largest single laboratory project the company has ever undertaken.

The programs in the new research center will concentrate on the design of new chemical molecules. Research will be directed to the development of new Flexol plasticizers, new synthetic resins, and new organic chemicals for agricultural and other use.

The laboratory building proper is designed as a three-story T-shaped structure of steel and brick, 325 feet long by 96 feet deep. It contains sixty-nine individual laboratories and 48 offices, a large-scale laboratory, a large library, an auditorium seating 125, and necessary storage and service rooms. All the laboratories as well as the offices are air conditioned.

Story of Tyer Rubber Co.

An interesting article covering the history of the Tyer Rubber Co. since its organization in 1856 is one of the features of the September 15, 1949, issue of *The Royle Forum*, popular house organ of John Royle & Sons, Paterson 3, N. J. The growth of the company from a manufacturer of rubber overshoes to its present position as one of the leading footwear and mechanical goods manufacturers is traced. Copies of the issue are available on request from the Royle organization.

A reduction in the wholesale prices of its U. S. Carpet Cushion was recently announced by U. S. Rubber. The reduction at the wholesale level made possible retail reductions of approximately 10%. This sponge rubber underlay is widely distributed in the floor covering field.

Carboline Co., St. Louis 5, Mo., is currently distributing a folder entitled "How to Resurface and Repair Rubber Lined and Hard Rubber Equipment for Corrosive Service." Data on five different resins for patching, relining, resurfacing, etc., is given.

Firestone Receives Marine Award

An official certificate of award from General C. B. Cates, Commandant of the United States Marine Corps, has been presented to the Firestone Tire and Rubber Co. "in appreciation of contributions to National Defense in granting leave to employees to attend Active Duty Training with the United States Marine Corps." J. E. Trainer, vice-president in charge of production for the company, received the award on behalf of the Firestone organization.

An extruded heat sealed gasket made of Geon is now being used on the Oasis Water Coolers manufactured by the Ebco Manufacturing Co., Columbus, Ohio. Use of the Geon gasket is said to have eliminated the rubbery taste and odor often attributed to the gasket used.

A new 28-page catalog giving detailed design, engineering and performance data for its line of transmission belting has been published by U. S. Rubber. It includes tables on belt speeds, arc of contact, friction, horsepower correction, and service factors.

OBITUARIES

A. Donald Cummings

A. Donald Cummings, chief chemist of the Collyer Insulated Wire Corporation for the past thirteen years, died on September 1 at the Roger Williams General Hospital in Providence, R. I., at the age of 45. He had been ill for a short time and entered the hospital the day of his death, caused by cerebral embolism. Born in Portland, Maine, Mr. Cummings was graduated from Bowdoin College in 1925 and the following year received an M.A. degree from Harvard University. After his graduation from Harvard, he was awarded a Goodyear Fellowship. From 1929 until 1932, he was associated with the National Bureau of Standards. Late in 1932 he joined the American Steel & Wire Co., at Worcester, Mass., remaining with that company until 1936 when he became associated with the Collyer Insulated Wire Co. Mr. Cummings, who lived in Barrington, R. I., was a member of the American Chemical Society, including the Rubber Division, and was also a member of the board of directors of the Providence Engineering Society. A widow and three children survive.

Laurence Day Ackerman

Laurence Day Ackerman, technical superintendent of the Converse Rubber Co., Malden 48, Mass., died of a cerebral hemorrhage on August 3, at the age of 63. Born in Bristol, New Hampshire, on August 8, 1886, Mr. Ackerman attended the Tilton School and New Hampshire University where he received his B.S. degree in chemical engineering. Prior to joining Converse, Mr. Ackerman had been associated with the Hood Rubber Co., Beacon Falls Rubber Co., U. S. Rubber Co., and the Seamless Rubber Co. in technical and research capacities. He was a member of the Boston Rubber Group, American Chemical Society, American Air Mail Society, Malden Stamp Club, Suburban Stamp and Curio Club and the Masons. Funeral services were held August 6 in Malden, Mass., with interment at Homeland Cemetery in Bristol, N. H. His wife and three daughters survive.

John A. Weber

John A. Weber, a mechanical engineer at the B. F. Goodrich Co., Akron, Ohio, for more than 40 years, died on August 14 at City Hospital in Akron, after an illness of two weeks. He was 61 years old. Mr. Weber was born in Mogodore, Ohio, and was a life resident of the Akron area. Services were conducted at Akron Baptist Temple on August 16 with burial in Greenlawn Cemetery. His wife and two daughters survive.

Charles E. Lanning

Charles E. Lanning, since 1942 secretary-treasurer of the United Rubber Workers of America, CIO, and a member of the executive board of the CIO's Political Action Committee, died on September 2 at Emergency Hospital in Washington, D. C. He was 49 years old. Mr. Lanning was long active in union affairs. At 17 he was elected president of a United Mine Workers local. A native of Hocking, Ohio, Mr. Lanning held office in several local unions in the Akron area from 1917 to 1936. While working for the Ohio Rubber Co., Willoughby, Ohio, he became president of the AFL Rubber Workers local union there, and when the rubber workers joined the CIO, he became a charter member of the CIO local. In 1936, Mr. Lanning became Midwest district field organizer for the URW. In 1942 he was elected secretary-treasurer of the URW, a position he held at the time of his death. His wife and nine children survive.

Stephen S. Berry, Sr.

Stephen S. Berry, Sr., a sales executive of the General Tire & Rubber Co., Akron, Ohio, who was recognized as one of the country's leading authorities on batteries, died at his home in Akron on September 5. Mr. Berry had worked at General since 1936 and was manager of the Kraft system and accessories sales, a position to which he was appointed in 1947. Previously, he had been in charge of battery sales. Mr. Berry had been in the tire and battery business for 22 years. He started with the Converse Rubber Co., Malden, Mass., and later served in an executive capacity with other battery and tire concerns. Mr. Berry served in World War I and belonged to the American Legion. He was a fourth degree member of the Knights of Columbus. His wife, two sons and a daughter survive.

Leo Edwin Levey

Leo Edwin Levey, general sales manager of the Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., Canada, died recently at Soldiers' Memorial Hospital in Orilla, Ont. He was 60 years old. A native of Schenectady, N. Y., Mr. Levey received his education there and some years later went to Toronto. Since 1911, when he joined the company, Mr. Levey held various positions in the sales organization including assistant sales manager of the Mechanical Division, and sales manager of the Automotive Tire and Accessories Division. In 1947, he was appointed general sales manager, a position he held until his death. He was a member of the Knights of Columbus, the Empire Club, and the Toronto Board of Trade. His wife survives.

William Deacon, Jr.

William Deacon, Jr., vice-president and plant manager of the W. S. Libbey Co., Lewiston, Me., died on August 18 in Central Maine General Hospital in Lewiston at the age of 65. Born in New Bedford, Mass., Mr. Deacon began his career with the American Woolen Co., later becoming a designer at the Dover, N. H., plant. In 1914 he became agent of the Forest Mill for the American Woolen Co. at Bridgeport, Maine. Six years later he became agent of the two American Woolen mills at Moosup, Conn. In 1923 Mr. Deacon was made manager of the Eastern Division of the concern at its head office at Shawsheen, Mass. He was resident manager of the concern's Webster, Mass., mills from 1925 to 1928, when he joined the Libbey Company as vice-president and plant manager. He was a member of the Lewiston Rotary Club. His wife and son survive.

W. Emmett Bittner

W. Emmett Bittner, vice-president in charge of purchases of the Diamond Alkali Co., Cleveland, Ohio, died at Mercy Hospital, Pittsburgh, Penna., on September 2 following an operation. He was 52 years old. Born in Pittsburgh on May 24, 1897, Mr. Bittner attended the public schools of that city, and also studied at Duquesne University and Carnegie Institute of Technology. He spent his entire business life with Diamond Alkali. Mr. Bittner joined the company in 1916, and three years later was transferred to the Purchasing Department as a buyer, subsequently becoming assistant purchasing agent, purchasing agent, and director of purchases, a post he held for eight years.

John Marshall

John Marshall, director of the Chemical Division of the Fabrics and Finishes Department of E. I. du Pont de Nemours & Co., Inc,. Philadelphia, Penna., died on August 27 in Birmingham, Penna., after a six months' illness. He was 58 years old. From 1927 to 1933, Mr. Marshall had been director of research at the company's paint research laboratories in Philadelphia. On July 12, ground was broken for a new research laboratory in South Philadelphia, named for Mr. Marshall. The John Marshall Laboratory is being constructed at a cost of $2,000,000, and is scheduled for completion late next year.

John R. Vincent

John R. Vincent, research chemist at the Jackson Laboratory of E. I. du Pont de Nemours & Co., died of a heart attack on June 10 in Newport, Del. He was 38 years old. Dr. Vincent received his B.S., M.S., and Ph.D. degrees at the University of Minnesota, the latter in organic chemistry in 1938. Upon completion of his academic studies he joined the Jackson Laboratory where he worked in the field of rubber chemicals. Dr. Vincent received recognition for his studies of antioxidants and peptizing agents, and was well known for his interpretation of statistical data.

THE STORY BEHIND THE WORD...

QUIZ...

A Dublin theatre manager once wagered that he could introduce a new word with no meaning into the language within 24 hours. To make good this bet, he had painted on every available space the letters QUIZ. Within a few hours the entire city of Dublin was astir. Everyone was asking the significance of this strange new "word." These countless inquiries gave birth to the new word "quiz," meaning to question or to inquire.

A long record of strength, stability and progressive leadership has made the word Muehlstein—the First Name in Scrap Rubber.

H. MUEHLSTEIN & CO. INC.

122 EAST 42nd STREET, NEW YORK 17, N. Y.

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CRUDE RUBBER · SYNTHETIC RUBBER · SCRAP RUBBER · HARD RUBBER DUST · PLASTIC SCRAP

Set this Gage

...then forget your thickness troubles

That's all there is to it. Once it's set, the "Magnetic" Schuster Gage keeps a constant, continuous check and control of material-thickness right on the roll during processing. Any variation beyond set limits is detected by the Gage and results in any instant action you desire: a warning signal, or automatic corrective adjustment of the mill, or automatic stopping of equipment.

Every P&W setup — consisting of "Magnetic" Schuster Gage, "Magnetic" Control Meter, power unit — is planned to eliminate time-and-material-wasting thickness variables. Pratt & Whitney is prepared to recommend the best setup for your equipment and requirements. New descriptive literature is yours for the asking.

Pratt & Whitney
Division Niles-Bement-Pond Company
WEST HARTFORD 1, CONNECTICUT

"Magnetic" Schuster Gage

NEW EQUIPMENT

Four-Roll Z-Type Calender

For production that demands extremely accurate gauge and temperature control, Farrel-Birmingham Co., Inc., Ansonia, Conn., has developed a new four-roll calender which introduces a change in roll arrangement from the conventional inverted "L" to "Z" formation. This "Z" arrangement has two rolls in a vertical plane

with a side roll opposite the top roll, and, on the other side, a fourth roll on a level with the bottom roll. Hydraulic pullback cylinders effectively hold the rolls in their operating position, completely eliminating any backlash in the boxes and adjusting screws.

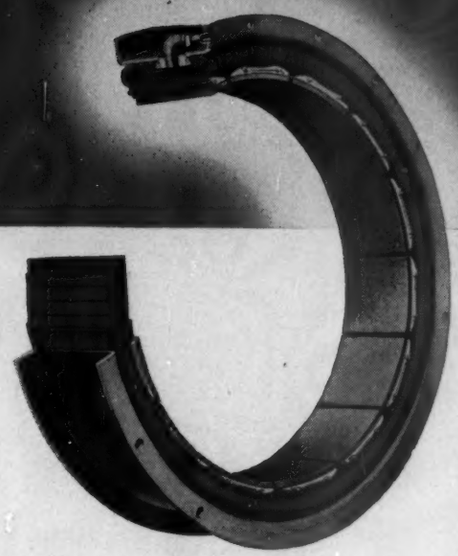
A unique feature of the Z-Type calender is the built-in device which provides for crossing the axes of the rolls to compensate for roll deflection. With this device, the amount of opening created by crossing the roll axes, which is closely equivalent to roll crown, can be varied at will by simply pushing a button. Thus the "crown" can quickly be changed to compensate for the differences in separating force caused by variations in stock composition, gauge and speed.

For film production or single coating, the two lower-rolls can be equipped with this adjustment to accurately adjust the roll opening for the final pass. For double coating, this feature may be installed for both upper and lower roll pairs. This makes such accurate gauge setting possible at the feed banks that in tire cord production, for example, practically no flatness rectification is necessary in the laminating pass. The cords are uniformly impregnated with light roll pressure which leaves the regularity of their parallel arrangement intact; also, less rubber is required for thorough cord coverage, an advantage in increasing the strength and life of the fabric.

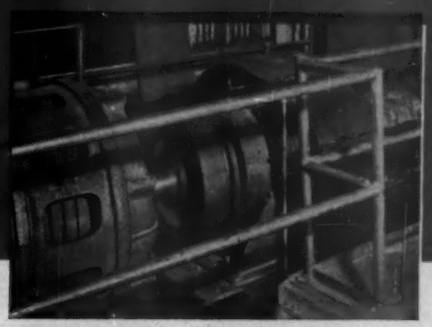
All rolls are chamber-bored and are also drilled beneath the chill to provide for most effective temperature

ONLY ONE MOVING PART

in this Fawick Clutch

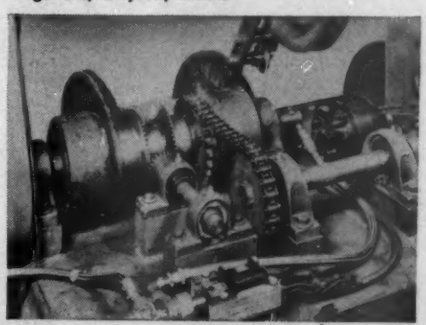


Fawick Airflex Clutch or Brake Type CB



Fawick Airflex Clutch & Brake used on drive of 60" Thropp Rubber Mill at Reeves Rubber Co., San Clemente, California.

Fawick Airflex Clutch & Brake on one 25 x 25 and one 24 x 26 Mill Drive at Dayton Rubber Mfg. Co., Dayton, Ohio.



Fawick Forward and Reverse Clutches on Plastic Wire Covering Machine by National Rubber Machinery Co., Columbiana, Ohio.

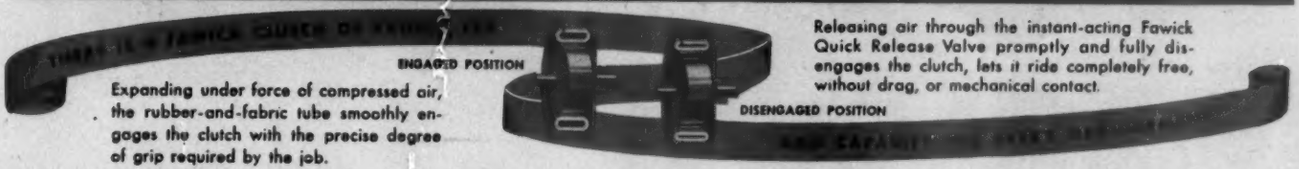
The rubber-and-fabric pneumatic tube faced with friction shoe assemblies is the only moving part in this Fawick Clutch. This part naturally stays in perfect adjustment at all times—automatically compensating for wear of the friction shoes.

Job-tested, Fawick Clutches meet the toughest operating conditions in many fields—petroleum, earth-moving, metalworking, rubber, paper, pulp and others.

Write our engineering department for a recommendation of the Fawick elements best suited for your machines. Address Dept. RA.

FAWICK Airflex CO., INC.

9919 CLINTON ROAD CLEVELAND 11, OHIO



ENGAGED POSITION

Expanding under force of compressed air, the rubber-and-fabric tube smoothly engages the clutch with the precise degree of grip required by the job.

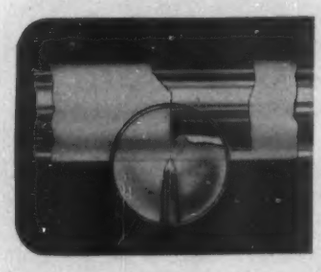
Releasing air through the instant-acting Fawick Quick Release Valve promptly and fully disengages the clutch, lets it ride completely free, without drag, or mechanical contact.

DISENGAGED POSITION

How *Camachines* have increased the sales appeal of friction tape

THE PROBLEM ▶

At one time rolls of friction tape were made by pressing a knife through long rolls of the material and the paper core. Rolls were misshapen. The edges of the tape were frayed, tangled, stuck together—a constant annoyance to the user.



◀ THE SOLUTION

The Camachine score cut method was adapted to a slitter-winder specially designed for fast production of top quality rolls of friction tape. Note how the web is cleanly parted by pressure of the slitter wheels against the smooth steel backing roller.

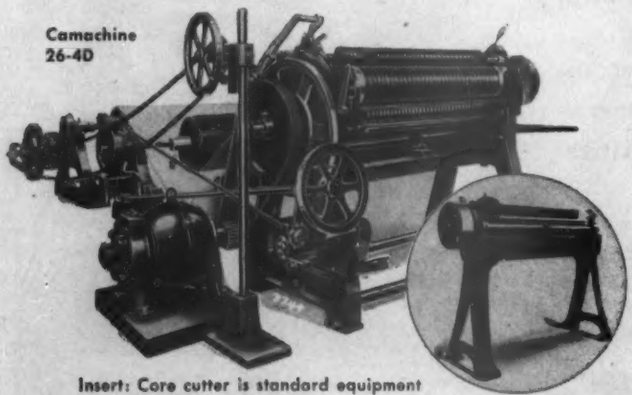
THE RESULT ▶

Clean-cut rolls that separate easily. Tape with clean, frayless edges that will not ravel. Camachine 26-4D handles web as wide as 49"; slits strip as narrow as ½" across the full width of the web; removes and rewinds the liner from the original roll.

This major improvement in friction tape was achieved because a production-minded idea man called in a Camachine expert to help work out a problem. Many other cost-cutting Camachines for the rubber industries have been developed in the same way. If you're looking for increased roll production, improved roll quality and lower costs, why not ask to see what we can do for you?

CAMERON MACHINE COMPANY • 61 Poplar St. • Brooklyn 2, N. Y.

Camachine 26-4D



Insert: Core cutter is standard equipment

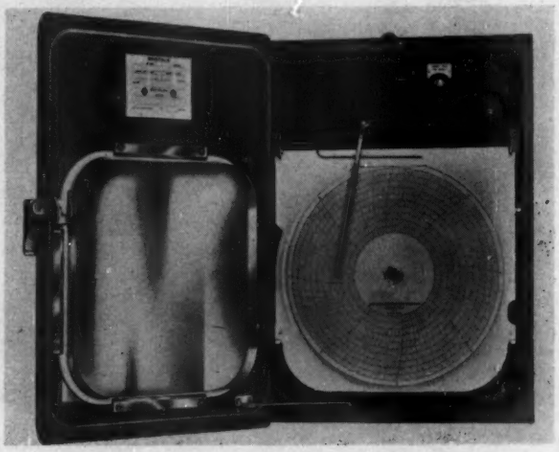
Camachines FOR FAST, TOP QUALITY ROLL PRODUCTION ... *the world over*

AA-208

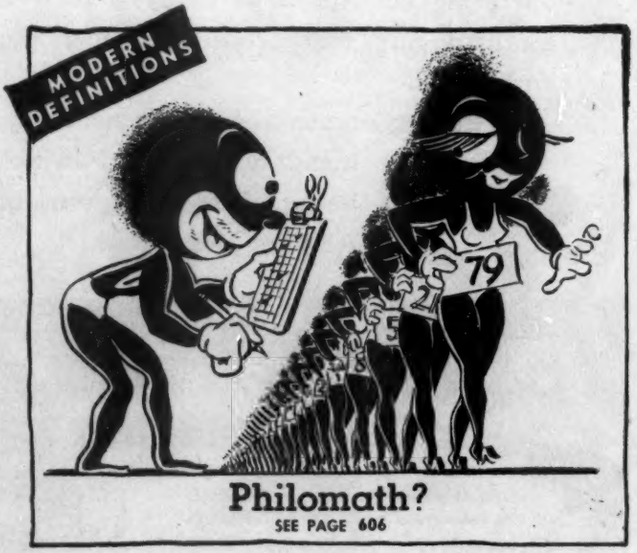
control. They are supported in flood-lubricated, full-bronze-lined journal boxes. The bearing lubricant is filtered before recirculation and is maintained at even temperature to prevent any change in viscosity. The heavy castings of the calender, including housings, roll boxes and stringer bedplates, are made of Meehanite metal.

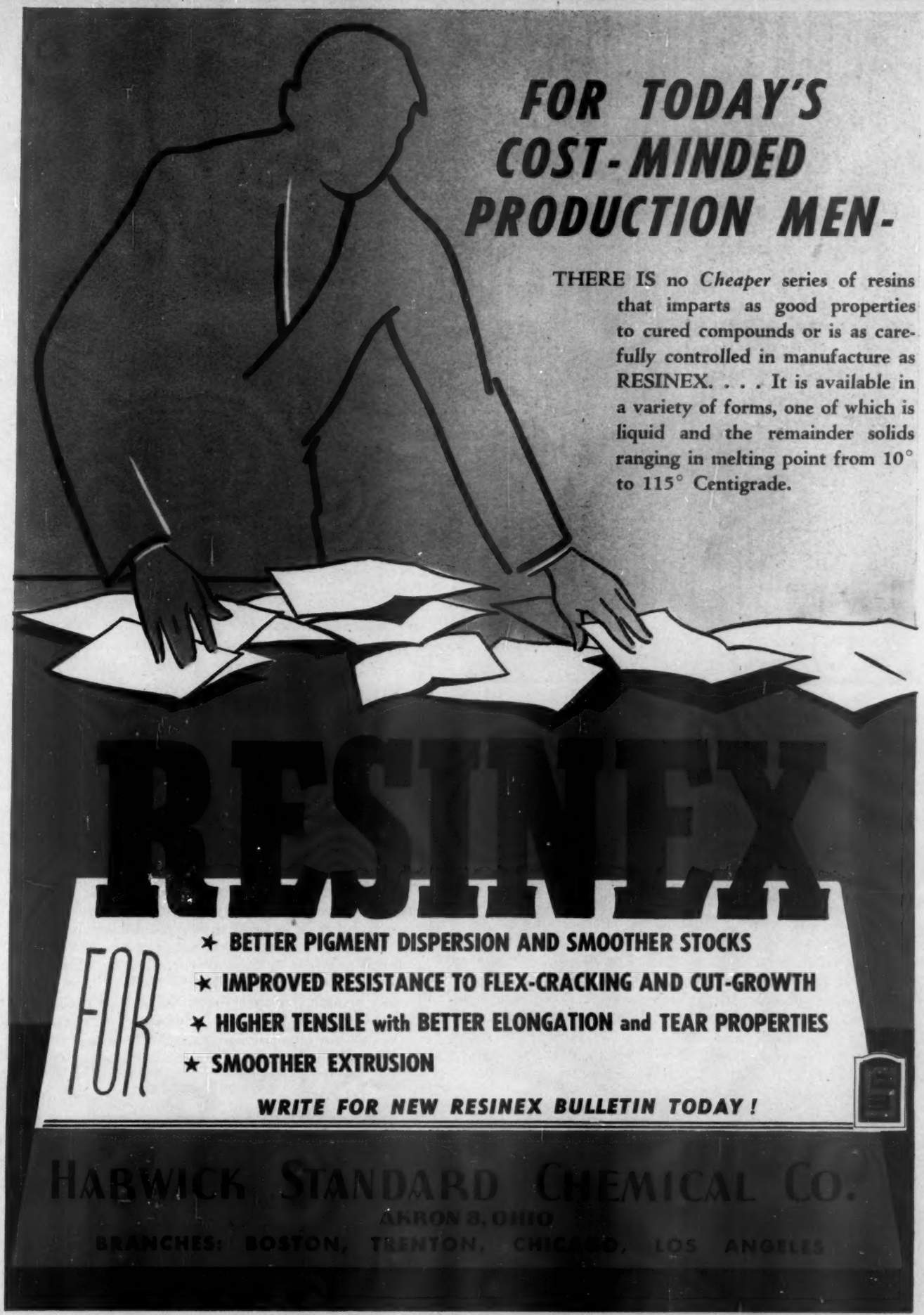
Bristol Running-Count Recorder

A new recording instrument, known as the Running-Count Recorder, has been announced by the Bristol Co., Waterbury, Conn. This newly-developed recorder plots on a circular chart, a curve of number of operations against time. It records the total count of intermittent operations and the time at which each one occurs,



and is used on production machinery to record work-producing operations or number of pieces produced. With this unit, the total number of operations or pieces produced can be easily found by multiplying the number of complete pen tranverses across the chart by the count per tranverse for which the instrument is calibrated. The hourly rate of production can also be read from the chart.




FOR TODAY'S
COST-MINDED
PRODUCTION MEN-
THERE IS no *Cheaper* series of resins that imparts as good properties to cured compounds or is as carefully controlled in manufacture as RESINEX. . . . It is available in a variety of forms, one of which is liquid and the remainder solids ranging in melting point from 10° to 115° Centigrade.
RESINEX
FOR
★ BETTER PIGMENT DISPERSION AND SMOOTHER STOCKS
★ IMPROVED RESISTANCE TO FLEX-CRACKING AND CUT-GROWTH
★ HIGHER TENSILE with BETTER ELONGATION and TEAR PROPERTIES
★ SMOOTHER EXTRUSION
WRITE FOR NEW RESINEX BULLETIN TODAY!
HARWICK STANDARD CHEMICAL CO.
AKRON 8, OHIO
BRANCHES: BOSTON, TRENTON, CHICAGO, LOS ANGELES

ATLAS-OMETERS

. . . used in Quality Control for plastic or rubber products at B. F. Goodrich Company

An important part of the tests at B. F. Goodrich Company Laboratories involves subjecting products to the destructive effects of weathering conditions they will be expected to meet in service. By using Atlas Fade-Ometers and Weather-Ometers it is often possible to obtain quickly, in advance of actual service, assurance that new materials will have satisfactory resistance to cracking, sun-checking, chalking, fading or bleeding of color, or to loss of elastic properties.

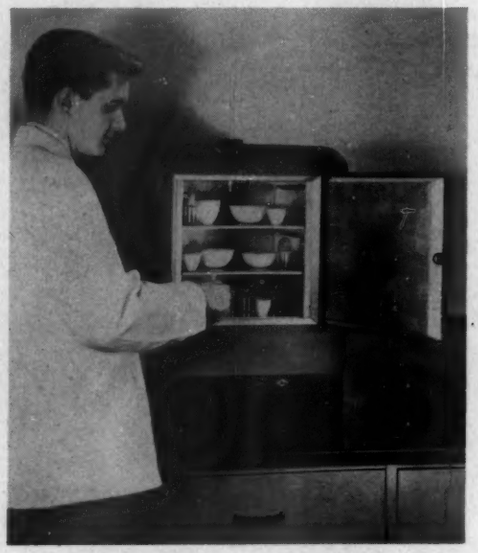
In the Fade-Ometer—used to check the reaction of any material or type of finish to the deteriorating effects of sunlight—plastic materials such as Koroseal are tested for permanence of bright color. The Weather-Ometer —which accurately duplicates rain, heavy dew, sunlight and thermal shock—offers complete control of these elements so that any desired climatic cycle can be obtained. Results of tests in the Weather-Ometer are used in the evaluation of the aging and weathering characteristics of rubbers and plastics under accelerated conditions corresponding to outdoor exposure.

The machines are easy to operate, fully automatic, and may safely be left in continuous operation overnight without attention from the operator.

ATLAS ELECTRIC DEVICES CO.
361 West Superior St., Chicago 10, Illinois
WEATHER-OMETERS • FADE-OMETERS • LAUNDER-OMETERS

Fisher Forced Draft Isotemp Oven

Embodying design features, specially-selected construction materials and operating advantages which produce uniform temperature throughout the 10 x 12 x 12-inch aluminum heating chamber, the Forced Draft Isotemp Oven, produced by the Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Penna., is said to perform



Open view of new Isotemp oven

drying operations in one-half to one-third the time required with a conventional gravity-type oven. The new oven has a motor-fan unit beneath the heating chamber and features an arrangement of ducts and louvres which conduct hot, dry air to the heating chamber. Once the selected operating temperature (range 75° to 175° C.) is attained, the new oven will maintain that temperature within plus or minus 1 degree.

Extra heavy glass wool insulation, aluminum shelving and heavy cast housing afford stability, even heat distribution and efficient operation. Current consumption is 550 watts and the oven draws current during only about one-fifth of the time after reaching pre-set temperature. The oven provides 400 square inches of shelf area. Safety features include a special latched door which will open should any pressure develop within the heating chamber; also, thermostat elements are sealed in a capsule, heating elements are embedded in a refractory material, and the entire heating area maintained at a relatively low temperature.

GRANULATED CORK
PROCESSED TO SPECIFICATION
MARYLAND CORK COMPANY, INC.
1528 Munsey Bldg. Baltimore 2, Md.

For Sale or Lease

PRACTICALLY NEW COMPOUND PLANT IN THE LOS ANGELES AREA

SUITABLE FOR PLASTICS, RUBBER OR ALLIED LINES

As a result of changes in manufacturing plans, a nationally-known company with plants in several cities has decided to dispose of its West Coast compound facilities. It therefore offers its virtually new, completely equipped compound plant, of medium size, for sale or lease. The building of reinforced concrete houses all the latest compounding facilities, in excellent condition and very little used:

BANBURY • MIXERS • SHEETING ROLLS • COOLING TUNNEL • AIR-VEYORS

Write or wire for particulars

BOX A-9, RUBBER AGE

For Dependability *Choose* ROYLE

Continuous Extruding Machines for the Rubber, Plastic and Chemical Industries

•

Continuous Vulcanizing Machines for Rubber Wire Insulation

•

Plastic Wire Insulation Machines

•

Strainers

•

Cooling Troughs

•

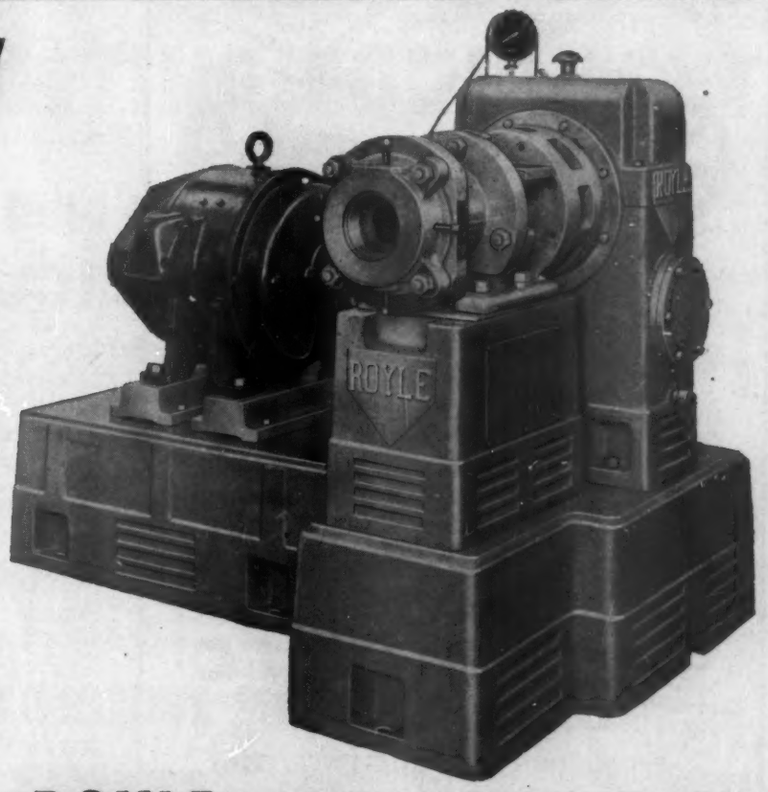
Light Wire and Cable Capstans

•

Motorized Take-Ups

•

Temperature Control Units



JOHN ROYLE & SONS — ROYLE PATERSON N. J. 1880

PIONEER BUILDERS OF EXTRUSION MACHINES SINCE

London, England — James Day (Machinery) Ltd. — REgent 2430

Home Office — E. B. Trout — J. W. VanRiper — SHerwood 2-8262

Akron, Ohio — J. C. Clinefelter — JEfferson 3264

Los Angeles, Cal. — H. M. Royal, Inc. — LOgan 3261

PATERSON 3, NEW JERSEY

ROYLE No. 2 Extruding Machine. Non-extended cylinder, plain tubing head, direct coupled drive. This extruding machine is designed for conventional applications in the rubber field.

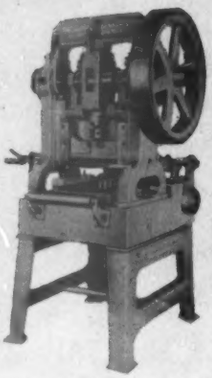
only COULTER can offer you all 4 RUBBER CUTTING MACHINES

1. MODEL A 1—cutting Heels at high speed production or short runs.

2. Model A 2—cutting Multiple Heels, Half and Full Soles with stock grain.

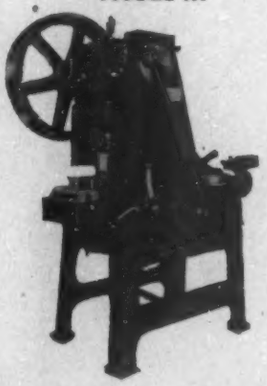
3. Model A 3—cutting Multiple Heels and Taps with or across stock grain.

4. MODEL A2s (Not illustrated) —cutting cross grain of stock.

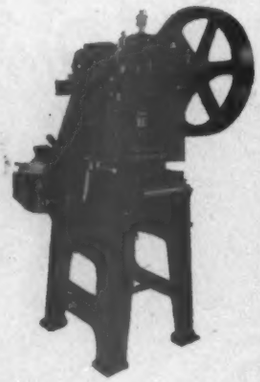


MODEL A2

MODEL A1



MODEL A3



MORE and MORE "UNIFORM QUALITY"

Years of comparisons for wear and service have proven COULTER offers more in higher quality cuttings . . . more in greater production. There is a COULTER MACHINE for cutting volumetric control and stripping of heels, soles, taps and other molded products. Specify a Coulter "Uniform Quality" Machine.

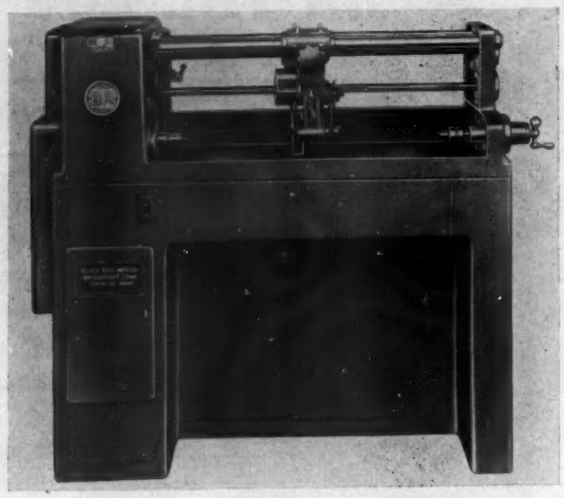
PRODUCTION MACHINES SINCE 1896

The James COULTER Machine Co.

BRIDGEPORT • CONNECTICUT • U.S.A.

Black Rock A-3 Washer Cutter

Developed to handle the general run of small washers up to 3 inches outside diameter, the A-3 Washer Cutting Machine has been developed by the Black Rock Manufacturing Co., Bridgeport, Conn. The use of the A-3 eliminates hand cutting of smaller washers, as mandrels of both 12½ and 26½ inches can be handled without difficulty. The stripping of the cut washers from the mandrel and the application of the uncut tube are performed in one operation through the use of the Black Rock 4-C double action stripping machine. The unit can handle small washers up to a minimum inside diameter of ⅜-inch. The minimum width of the washers is 1/32-inch and the maximum width is 15/32-inch. The A-3 unit utilizes a ¾ h.p motor of 1200 rpm. The maximum number of cuts per minute is 250.



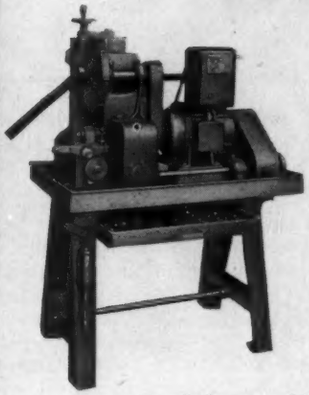
Fluid-Motor Valve Operator

A simplified fluid-motor operator for gate valves has been developed by the Crane Co., 836 S. Michigan Avenue, Chicago 5, Ill. This new design makes possible extensive use of motor-operated valves, since the actuating unit can be easily adapted to standard valves in stock or to valves already installed. This previously has been a virtual impossibility, for motor-operated valves have customarily been made up on special order to the requirements of the installation. The device can be operated by water, oil or compressed air or gases.

The motor unit, comprising the motor, gear box and yoke, is bolted to the valve bonnet; and the motor operates the valve stem through the gear box. The motor derives its power from five flexible diaphragms, mounted radially about an eccentric on the drive shaft. The operating fluid is admitted in rotational sequence to the five diaphragms, which actuate pistons that transmit the thrust to the eccentric through a roller bearing mounted on the shaft. By means of a suitable control, the operating fluid can be admitted through either of two entrance ports, controlling the direction of operation of the motor for opening and closing the valve.

When the valve gate reaches the end of its travel in either direction, the motor merely stalls, still under pressure. There can be no leakage, and shut-off devices are unnecessary. The valves can be operated by a wide range of liquids or gases at pressures from 40 to 300 psi.

For Immediate Shipment.. Thropp Automatic



Washer Cutters

THE Thropp Automatic Washer Cutter does not require mandrels. It will cut washers for hose connections, bottle stoppers, plumbers' washers, synthetics, uncured stock for molds, etc. A single unskilled operator can run one or more of these machines at the same time. Size of Cuts: 1/4" in diameter to 1 3/4" inclusive, and from 3/32" to 1 1/2" in length.

Capacity: 100 cuts per minute on long lengths and big diameters; and 200 cuts per minute on narrow widths and small diameters.

Shipment: Shipment can be made from stock on a limited number of units complete with motor and control, wired and ready for installation.

- *West Coast Rep.:* H. M. Royal, Inc., Los Angeles, Cal.
- *Export Agent:* Steinhardter & Nordlinger, 105 Hudson St., N.Y.

THROPP

WM. R. THROPP & SONS CO. Trenton, N.J.

Accelerator 2-MT

by

DU PONT

Has many advantages in rubber stocks

- ★ Resists heat and aging.
- ★ Little tendency to revert during long cures.
- ★ Resists flex cracking.
- ★ Retains tensile strength and tear resistance at elevated temperatures.
- ★ Low heat build-up.

DU PONT RUBBER CHEMICALS

E. I. DU PONT DE NEMOURS & CO. (INC.)

WILMINGTON 98, DELAWARE

BETTER THINGS FOR BETTER LIVING ...THROUGH CHEMISTRY

DU PONT

NRM COST CUTTING EQUIPMENT

- **MODEL 49 TIRE BUILDING MACHINES** sequence timed for high output and balanced uniform product
- **AUTOMATIC BIAS CUTTERS** fast sequence cutting of various predetermined ply widths
- **PRECISION TREAD CUTTERS** accuracy within 1/16" to eliminate recutting
- **TUBE BUTT SPLICING MACHINES** Goodyear and Weldstitch types
- **TIRE SHAPERS — BAGGERS** Vacuum and pressure types for all sizes of tires
- **EXTRUDERS** advanced design for rubber and plastics

and a wide variety of special machinery employed in the production of tires and tubes

- **TIRE AND TUBE MOLDS**

NATIONAL RUBBER MACHINERY CO.

General Offices: AKRON 8, OHIO

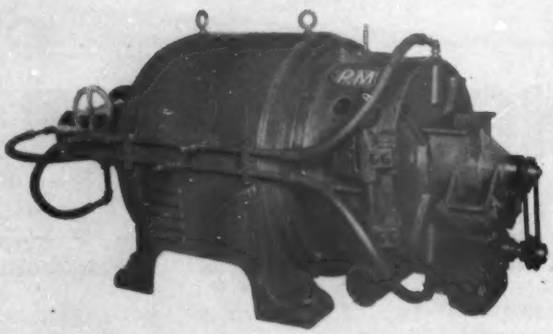
Creative Engineering

P. M.
GRINDING AND CUTTING EQUIPMENT

•

HEAVY DUTY CUTTER

- This machine is specially designed for reducing to small size pieces all kinds of soft and hard rubber scrap.
- Water cooled sides allow continuous operation of the machine, without overheating.
- Provided with safety type drive pulley.
- The capacity of the P.M. CUTTING MACHINE is from 600 to 1000 lbs. per hour on soft rubber and 1000 to 1500 lbs. on hard rubber scrap.
- Power required 10 H.P. 4 V-belt drive.



HEAVY DUTY RUBBER GRINDER

- Available in Direct or Belt Drive.
- 50 H.P. motor.
- Operation entirely automatic.
- Water cooled to permit continuous operation without overheating.
- Fineness of ground rubber easily adjusted by simple turn of wheel.
- Capacity 400 to 800 lbs. per hour.

Developed to meet the need for a more rugged Scrap Rubber Grinder with increased capacity

RESEARCH ENGINEERING COMPANY

102-21 63rd Drive

Forest Hills, L. I., N. Y.

REVIEWS

BOOKS

Physics and Chemistry of Cellulose Fibres. By P. H. Hermans. Printed in the Netherlands. Available from Elsevier Publishing Co., Inc., 215 Fourth Ave., New York 3, N.Y. 6¼ x 9½ in. 534 pp. $9.50.

One of the volumes in the current Elsevier Polymer Series on the chemistry, physics and technology of high polymeric and allied substances, the present volume, as indicated by its title, is devoted to the physics and chemistry of cellulose fibres. It is a comprehensive treatment of those results and views of purely scientific cellulose research which seem to the author, from the technical standpoint, the fundamentals and the most important equipment for further scientific penetration into technical thought and research on the subject.

The book is divided into three parts. Part I deals with the molecular and crystalline structure of cellulose and the behavior of chain molecules in solution and in the gel state. Part II deals with the morphology and the physical and chemical properties of natural and artificial cellulose fibres. A very extensive and fundamental discussion of the swelling and deformation processes in regenerated cellulose model filaments is contained in Part III, where Dr. Hermans emphasizes the analogies and differences existing between the swollen cellulose gel and other rubberlike materials.

BOOKLETS, CATALOGS, etc.

Kralac A: A High Styrene Copolymer. (Compounding Research Report No. 11). Naugatuck Chemical Division, U. S. Rubber Co., 1230 Avenue of the Americas, New York 20, N. Y. 8½ x 11 in. 20 pp.

A description of Kralac A and a discussion of its general applications are offered in this report. The processing and compounding of the product are considered, and attention paid to the effects of adding this high styrene copolymer to typical GR-S base recipes. The use of Kralac A in molded soles and heels and in hard rubber type stocks is also discussed. The properties of natural rubber-Kralac A stocks at elevated temperature and the use of the product in pure gum natural rubber stocks are outlined. Other subjects covered include the use of Kralac A with acrylonitrile rubber and with neoprene. Suggestions for other uses are given.

•

National Pallets. National Pallet Corp., Oliver Building, Pittsburgh 22, Penna. 8½ x 11 in. 16 pp.

Many types of wooden pallets made by the company are illustrated and described in this catalog. Some of the different pallets described include standard, reversible, 4-way, 4-way block, utility and cargo types. Some of the special pallets described include collapsible rack types, stationary models, utility box types, expendable types, skids, expendable utility types, and others. Load limits, variations and alternate assemblies for many of the different models are also offered.

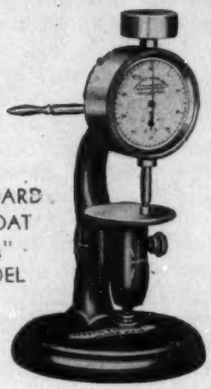
•

Carbon Black Pigments. Special Blacks Division, Godfrey L. Cabot, Inc., 77 Franklin St., Boston 10, Mass. 8½ x 11 in. 16 pp.

This booklet is intended as a guide to the Cabot blacks most suited to a given product. A complete list of carbon black pigments is provided together with technical data, testing procedures, electrical properties and packing information. Black pigments for the plastics, ink, paper and paint industries are discussed.

RANDALL & STICKNEY

THICKNESS GAUGES FOR RUBBER



STANDARD THROAT 1¾" MODEL

THROAT DEPTHS
1¾" to 26"

FOOT TENSIONS
supplied by Internal Spring or Direct Weights

FOOT DIAMETERS
⅛" to 1¼"

ROLLS
Table and Roll or two Rolls

RANGE
½" or 1", also 1 CM Metric

26" DEEP THROAT MODEL

SEND FOR CIRCULARS to Dept. A.

FRANK E. RANDALL CO.
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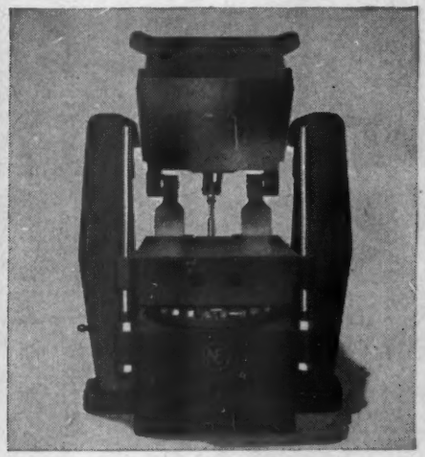

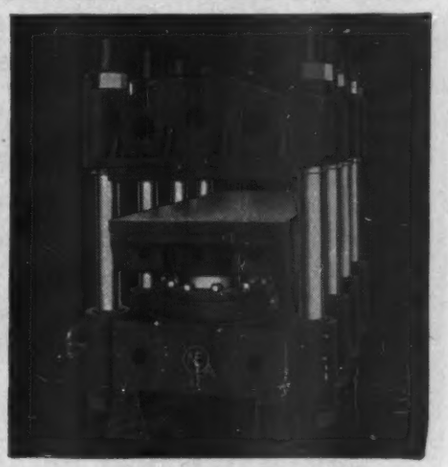

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Indonex Plasticizers with High Styrene Copolymers in GR-S and Natural Rubber Compounds. (Circular No. 13-36). Indoil Chemical Co., 910 South Michigan Avenue, Chicago 80, Ill. 8½ x 11 in. 6 pp.

This study of Indonex plasticizers has been divided into four parts. First, a series of seven compounds comparing 10 to 30 parts of Indonex 638½ or smoked sheet with 100 parts Marbon S. The second part comprises three medium hardness compounds of Marbon S with smoked sheet with and without Indonex plasticizer. The third part comprises three vulcanizable compounds in the high hardness range, using GR-S with a high proportion of Marbon S and with and without Indonex 638½. The fourth section describes a natural rubber press roll compound formulated with Marbon 8000 and Indonex 638½. The information is presented in tabular form as well as in text material.

•

The Evaluation of Carbon Blacks in Natural and Synthetic Rubbers. By F. H. Amon and E. M. Dannenberg. Godfrey L. Cabot, Inc., 77 Franklin St., Boston 10, Mass. 8½ x 11 in. 24 pp.

Laboratory processing and physical test data on ten brands of carbon black which were obtained in natural rubber and three types of synthetic rubber are presented in this report. The synthetic rubbers include standard GR-S (polymerized at 122°F.), and the "cold rubbers", X-485 (polymerized at 41°F.) and XP-137 (polymerized at 14°F.). The results for the different carbon blacks have been averaged for all rubbers and summarized in tabular form. In the same vein, Cabot has issued subsidiary data on carbon blacks in polyethylene.

•

Cabot Carbon Blacks in Butyl Tube Stocks. Godfrey L. Cabot, Inc., 77 Franklin St., Boston 10, Mass. 8½ x 11 in. 8 pp.

The tests included in this report show the relative properties of two Cabot furnace blacks in butyl tube formulations. Test data concerns such information as processing, reinforcement, electrical resistance, etc. Vulcan 1 and Sterling SO were the two blacks studied.

•

Faster Finishing Midget Mills. (Catalog No. 17). Severance Tool Industries, Inc., Saginaw, Mich. 8½ x 11 in. 32 pp.

This catalog contains information on midget mills, deburrers and countersinks manufactured by the company. Miscellaneous units are also presented. Each of the specific items is illustrated and described as to construction, dimensions, use and maintenance.

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Ferro Stabilizer Data Book. Ferro Chemical Corp., Bedford, Ohio. 9 x 11 in. 50 pp.

This manual is divided into four sections, the first of which explains the chemical nature of Ferro stabilizers, lists physical properties and identifies each product by number and type. Test methods are outlined in the second section. A description of test factors is given along with detailed preparation of test samples including both calendered vinyl resins and plastisols. Individual performance data is next covered, with results of test data for each stabilizer itemized. The fourth section deals with general performance data, and includes a discussion of various ways in which vinyls decompose, listing curves of color gain versus time.

•

Simplified Preventive Maintenance Control for Plant and Production Control. (KD-449). Systems and Methods Research Department, Remington Rand, Inc., 315 Fourth Avenue, New York 10. N. Y. 8½ x 11 in. 6 pp.

Preventive maintenance of machines and equipment and the record control system needed to administer such a program effectively are covered in this folder. The folder also outlines how preventive maintenance records may be combined with property records to insure that exactly the right amount of equipment is on hand at all times, maintained in top operating condition. A section is also devoted to inventory systems used to control stocks of replacement parts and operating supplies.

•

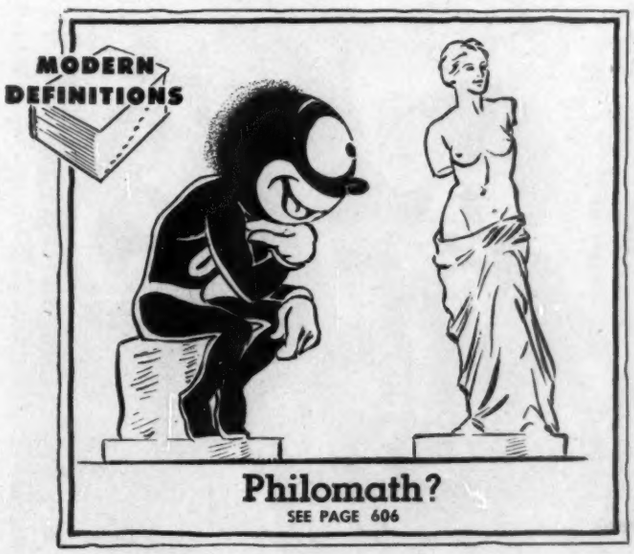
Brookfield Synchro-Lectric Viscometer. Brookfield Engineering Laboratories, Inc., Porter St., Stoughton, Mass. 8½ x 11 in. 8 pp.

The advantages in use of the Synchro-Lectric Viscometer as an accurate instrument for quickly and directly measuring the viscosity or flow characteristics of materials, both in laboratories and at point of process, are discussed in this catalog. Various models of the instrument are described and illustrated, and methods of operation outlined. Construction details of a typical 4-speed viscometer are presented in detail.

•

Polyac as a Stiffening Agent for GR-I. (Report No. BL-233). Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. 6 x 9½ in. 8 pp.

The data in this technical report are the results of a study to determine the factors affecting the degree of stiffening obtained using Polyac. The variables investigated include the concentration of Polyac, the temperature of mastication and the time of mastication. The information is presented in chart and tabular form with explanatory text notes.



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REVIEWS (CONT'D)

Automobile Facts and Figures. (29th Edition). Automobile Manufacturers Association, New Center Building, Detroit 2, Mich. 6 x 9 in. 80 pp.

This edition presents a comprehensive compilation of data on developments in the automotive industry during 1948. Some of the data presented includes sales and registration surveys by states; the distribution of the industry by states; number of drivers by states; accident data; accessory sales; industry employment census; tax surveys; highway expenditures; exports, and examination of laws and codes pertaining to motor vehicles and their use. Members of the association and the different industry organizations are listed.

•

Hercules Synthetic Resins. Synthetics Department, Hercules Powder Co., Inc., Wilmington, Del. 8½ x 11 in. 20 pp.

A key to specific uses for Hercules synthetic resins is provided in this technical booklet by a chart which matches the resins with their actual and potential uses. From this index the formulator who is faced with a resin problem can pick out the resins indicated for use in a particular field. Each of the resins is briefly described as to physical and chemical properties. Resins discussed in this booklet are used in the manufacture of protective coatings, adhesives, printing inks, linoleum and floor tile, asphalt combinations, essential oils and fixatives, etc.

•

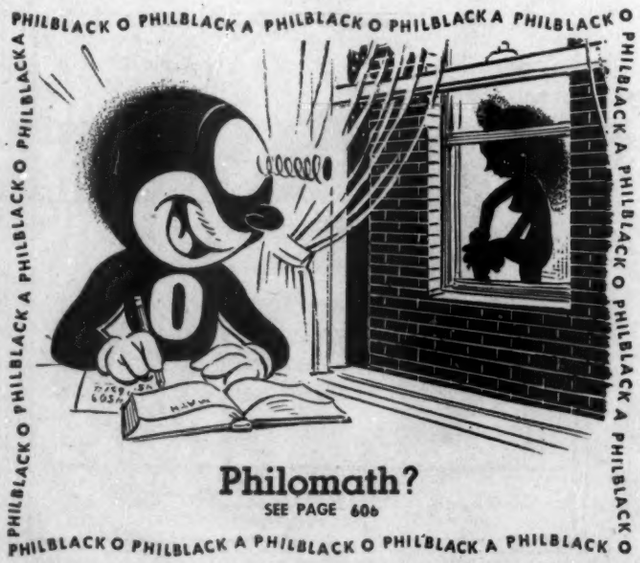
Gits Visual Oilers. Gits Bros. Mfg. Co., 1846 South Kilbourn Avenue, Chicago 23, Ill. 8½ x 11 in. 8 pp.

The latest line of Gits Visual Oilers are presented in this booklet which features endorsements from equipment manufacturers and maintenance engineers on specific applications. Photographs and diagrams of the different units are included. Examples of the units include gravity feed, wick feed, constant level, vibrating rod and multiple oilers. Detailed information is presented for every type of oiler, together with stock number, capacity, dimensions and prices.

•

Products for Petroleum. (No. 6903). Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N. J. 8½ x 11 in. 16 pp.

Those products manufactured by the company for oil field use and in the handling of petroleum are discussed in this catalog. The products covered include hose used in drilling, transporting, refining and maintenance, belting, friction materials, packings and miscellaneous supplies. Each of the individual items is illustrated and described as to specifications and use.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MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, SEPT. 8, 1949

Natural Rubber

The price of spot rubber on the Commodity Exchange has swung in the rather wide range of 1.74 cents since our last report (August 8), high for the period being 18.12 cents reached on September 6, and low being 16.38 cents reached on August 9. The average price of spot rubber for the month of August was 16.60 cents based on 23 trading days. This compares with an average of 16.45 cents for the month of July.

The increase in crude rubber prices has given rise to conjecture as to its causes and effects. The advance has taken place during a period when the imminence of sterling reevaluation would tend to disrupt an upswing in prices. Also, U. S. consumption of crude for July was at an exceedingly small level.

Now that the market has scored such a sharp advance, it has been disclosed that much of the rubber afloat, on the way to the United States, was shipped on consignment, and has already been liquidated. A good portion of the available nearby rubber held locally is said to have been sold to consumers. The bulk, if not all, of the last offerings of Government rotation rubber has also been absorbed.

Additional purchases of natural crude rubber totaling approximately 21,000 long tons for U. S. stockpiling were announced by the Economic Cooperation Administration. The purchases were made through the London rubber market at a cost of approximately 2,100,000 pounds sterling, about $8,463,000.

Today's quotations on the outside market, London and Singapore follow:

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.18⅛
October-December	.17¾
January-March	.17½
Thin Latex Crepe:	
Spot	.22¼
September	.22¾
Thin Brown Crepe, No. 2	.15¼
Ambers, No. 3	.15¼
Flat Bark Crepe	.12¾

London Market

(Standard Smoked Sheets)

October-December	17.59 - 17.69
January-March	17.17 - 17.27

Singapore Market

(Standard Smoked Sheets)

September	16.78 - 16.88

Synthetic Rubber

(Dry Types-Per Pound)

Butaprene NF	.440 - .450
Butaprene NL	.450 - .460
Butaprene NAA	.490 - .500
Butaprene NXM	.520 - .530
Chemigum 30 N4NS	.400 - .470
Chemigum 50N4NS	.400 - .470
Chemigum N3	.450 - .520
GR-I	—— - .185
GR-S	—— - .185
Hycar OR-25	.450 - .460
Hycar OR-15	.520 - .530
Hycar OS-10	.500 - .510
Neoprene Type E	—— - .650
Neoprene Types CG and AC	—— - .500
Neoprene Types FR and KNR	—— - .750
Neoprene Type S	—— - .320
Paracril 18	.430 - .450
Paracril 26	.440 - .460
Paracril 35	.510 - .530
Silastic (compounded)	2.35 - 4.40
Thiokol Type A	.370 - .470
Thiokol Type ST	.750 - .850
Thiokol Type FA	.520 - .620
Thiokol PR-1	.750 - .850

Scrap Rubber

Slight evidences of an upswing in market conditions have been noted for scrap rubber. A brighter outlook for the export of scrap rubber has served as a stimulus to the general business cycle. The end of duration periods has also contributed to upward trends in the industry. Prices for scrap rubber remain at substantially the same levels. Current quotations follow:

Mixed passenger tires	ton	$12.00
Beadless truck tires	ton	nom.
Mixed truck tires	ton	13.00
Beadless passenger tires	ton	nom.
No. 1 passenger peelings	ton	42.50
No. 1 truck peelings	ton	42.50
Red passenger tubes	lb.	.06½
Black passenger tubes	lb.	.03½
Mixed passenger tubes	lb.	.03½
No. 2 truck tubes	lb.	nom.
Red truck tubes	lb.	.06½
Black truck tubes	lb.	.03¼
Buffings	ton	15.00

Reclaimed Rubber

Consumption of reclaim for the month of July is estimated at 16,019 tons by the Department of Commerce, which compares with 19,316 tons in the month of June. Trade sources advise that the general picture for reclaim is good. This upward trend is reflected in the ratio of reclaim consumption to total new rubber consumption, which, for the first time in several months, is approaching levels reached in previous years. There have been no changes in prices. Current quotations follow:

Tires

Black, Digester (Natural)	lb.	.08¾ - .08¾
Peels No. 1	lb.	.08½ - .09¼
Whole Tire (Blend)	lb.	.08¾ - .08¾

Inner Tubes

Black (Natural)	lb.	.11½ - .12
Red (Natural)	lb.	.13½ - .14½
Butyl	lb.	.08¾ - .08¾

Shoe

Unwashed (Natural)	lb.	.08¾ - .09¼

Cotton Tire Fabrics

While other types of yarns and fabrics have been experiencing an upward trend, the market for cotton tire fabrics has held to the low level maintained for the past several months. As in the past, the general instability of the domestic as well as the export markets, and the changeover to rayon and nylon cords, have contributed to the picture as it is today. There have been no changes in the price structure. Current quotations follow:

Standard, Peeler, 12/4/2	lb.	.68
Standard, Peeler, 14/4/2	lb.	.70
Standard, Peeler, 16/4/3	lb.	.7250
Extra Staple, Peeler, 12/4/2	lb.	.8315
Extra Staple, Peeler, 14/4/2	lb.	.8575
Extra Staple, Peeler, 16/4/3	lb.	.8825

Chafers

14.4 oz. (per sq. yard)	lb.	.67
9.25 oz. (per sq. yard)	lb.	.6325
11.65 oz. (per sq. yard)	lb.	.60
8.9 oz. (per sq. yard)	lb	.6475

Cotton

The price of middling uplands on the Cotton Exchange has swung in a range of 1.38 cents since our last report (August 8), high for the period being 32.43 cents reached on August 11, and low being 31.05 cents reached on September 8. The average price of middling uplands for the month of August was 32.06 cents based on 23 trading days. This compares with an average of 32.99 cents for the month of July.

The Department of Agriculture has predicted that this year's cotton crop would be the fifth largest of record, totaling 14,943,000 bales or 138,000 bales more than was forecast a month ago. Production was 14,868,000 bales last year and the ten year (1938-47) average was 11,306,000 bales.

This year's crop will be supplemented by a carry-over or reserve of about 5,200,000 bales from previous crops to give a total supply of about 20,000,000 bales. Officials said present prospects point to a market for only about 12,500,000 bales.

President Truman recently signed into law a bill giving the Department of Agriculture sweeping new powers to cut down cotton planting next year and the year thereafter. The law revises the old AAA system of acreage allotments and marketing quotas. It is designed to deal with mounting cotton surpluses resulting from increased yields and the wartime entry of western farmers into a cotton market long dominated by the south.

Quotations for middling uplands on the Exchange follow:

	Aug. 8	September 8		
	Close	High	Low	Close
October	29.82	30.07	29.76	29.79
December	29.83	30.07	29.74	29.78
March	29.77	30.07	29.73	29.78

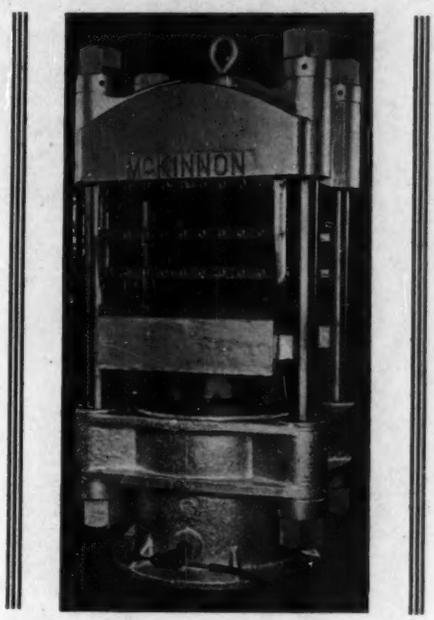
Closing Rubber Prices on New York Commodity Exchange

(No. 1 R.S.S. Contract)

FROM AUGUST 9 TO SEPTEMBER 8

Date Aug.	Spot	Sept.	Dec.	Mar.	May	Sales
9	16.38	16.48	16.10	15.90	15.73	118
10	16.43	16.54	16.17	15.93	15.78	154
11	16.54	16.60	16.20	15.90	15.75	88
12	16.54	16.60	16.25	16.00	15.85	65
13	——	——	——	——	——	——
14	——	——	——	——	——	——
15	16.82	16.93	16.55	16.34	16.12	140
16	16.94	16.91	16.45	16.25	16.05	145
17	16.67	16.67	16.26	16.05	15.85	146
18	16.50	16.51	16.16	15.95	15.80	121
19	16.50	16.59	16.20	16.00	15.85	267
20	——	——	——	——	——	——
21	——	——	——	——	——	——
22	16.88	16.88	16.52	16.30	16.15	94
23	16.75	16.68	16.39	16.20	16.00	86
24	16.75	16.73	16.38	16.10	15.95	82
25	17.00	16.94	16.55	16.28	16.14	90
26	16.88	16.82	16.44	16.17	16.04	54
27	——	——	——	——	——	——
28	——	——	——	——	——	——
29	16.88	16.88	16.45	16.17	16.00	73
30	17.12	17.10	16.60	16.30	16.15	63
31	17.25	17.45	16.75	16.45	16.30	156
Sept.						
1	17.50	17.64	16.90	16.65	16.45	162
2	17.75	17.97	17.21	16.90	16.65	77
3	——	——	——	——	——	——
4	——	——	——	——	——	——
5	——	——	——	——	——	——
6	18.12	18.28	17.47	17.15	16.96	233
7	17.88	18.11	17.35	17.02	16.75	189
8	18.00	18.30	17.40	17.10	16.85	153

STANDARD OR SPECIAL BUILT
HYDRAULIC PRESSES



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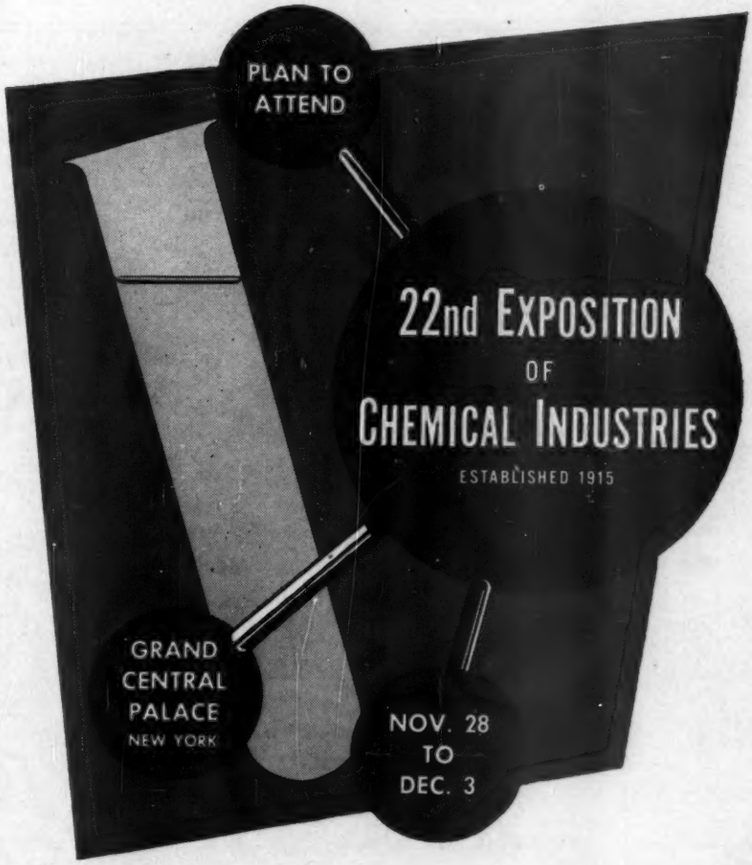

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STATISTICS *Of Interest to the Rubber Industry*

U. S. Imports and Re-Exports of Natural Rubber

	GROSS IMPORTS												
	Natural Rubber (Dry)			Natural Rubber (Latex)			Guayule				RE-EXPORTS		TOTAL NET IMPORTS
Year	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Long Tons	Total Declared Value	Average Declared Value per pound Cents	Total Gross Imports Long Tons	Long Tons	Total Declared Value	Long Tons
1936	467,064	152,072,496	14.54	19,852	6,659,899	14.98	1,229	286,552	10.41	488,145	12,581	4,488,223	475,564
1937	574,600	237,307,041	18.44	23,185	10,213,670	19.67	2,694	745,873	12.36	600,479	7,902	3,385,433	592,577
1938	397,620	125,357,730	14.07	11,878	4,147,318	15.59	2,485	623,819	11.21	411,983	5,652	1,799,124	406,331
1939	469,803	167,558,245	15.92	27,438	10,467,552	17.03	2,232	463,345	9.27	499,473	13,125	5,832,618	486,348
1940	780,820	303,117,726	17.33	33,789	14,593,466	19.28	3,634	758,007	9.31	818,243	7,060	3,197,136	811,183
1941	989,329	401,890,393	18.14	34,798	15,965,627	20.48	4,881	1,145,767	10.48	1,029,008	5,376	2,757,872	1,023,632
1942	265,980	112,377,896	18.86	10,646	5,630,667	23.61	5,523	1,660,792	13.42	282,149	10,856	5,913,386	271,293
1943	50,348	31,364,033	27.81	1,890	1,312,202	30.99	7,679	3,636,789	21.14	59,917	22,587	16,446,707	37,330
1944	103,820	73,908,389	31.78	3,091	2,092,211	30.22	6,700	3,351,233	22.33	113,611	9,739	8,712,695	103,872
1945	134,454	95,850,441	31.82	4,773	3,115,853	29.14	10,040	5,963,797	26.52	149,267	9,509	7,201,746	139,758
1946	366,415	222,552,939	27.12	8,421	5,843,085	30.98	5,344	2,859,246	23.89	380,180	7,711	5,331,954	372,469
1947	690,954	306,919,456	19.83	17,722	9,820,080	24.91	2,880	1,492,825	20.30	711,556	4,122	2,354,494	707,434
1948	702,293	290,849,177	18.49	32,762	18,288,223	24.92	302	71,330	10.53	735,357	6,672	3,259,324	728,685
1947:													
Dec.	69,158	24,458,323	15.21	2,438	1,280,834	23.45	....	.....	....	71,596	371	215,958	71,225
1948:													
Jan.	76,723	29,782,199	17.33	4,130	2,044,850	22.11	....	.....	....	117,906	334	206,103	117,572
Feb.	51,528	21,027,604	18.06	2,400	1,420,676	26.43	43	10,235	10.53	53,971	290	170,339	53,681
Mar.	68,848	27,902,550	18.09	3,148	1,730,014	24.02	25	6,845	10.05	72,021	467	215,156	71,554
Apr.	38,433	15,136,536	17.35	2,284	1,260,932	24.65	30	7,076	10.53	40,747	343	190,815	40,404
May	37,227	14,409,747	17.28	3,442	1,915,744	24.84	40	9,435	10.53	40,709	1,031	485,941	39,678
June	62,376	25,338,739	18.13	2,288	1,335,173	26.05	60	14,152	10.53	64,724	718	348,043	64,006
July	60,070	25,206,980	18.07	3,654	2,002,902	24.48	100	23,587	10.53	63,734	466	243,774	63,268
Aug.	65,736	26,975,557	18.33	2,395	1,389,495	25.81	....	.....	....	67,771	520	268,912	67,251
Sept.	49,119	21,480,244	19.52	1,434	813,347	25.24	....	.....	....	50,553	514	229,016	50,039
Oct.	58,300	26,161,356	20.03	2,728	1,574,419	25.83	....	.....	....	61,028	675	320,570	60,353
Nov.	49,800	22,292,055	19.98	813	466,095	25.59	....	.....	....	50,613	772	349,315	49,841
Dec.	83,419	35,495,327	19.00	4,216	2,366,959	24.75	....	.....	....	87,635	569	250,540	87,066
1949:													
Jan.	66,575	27,037,698	18.13	1,132	634,165	25.02	....	.....	....	67,707	757	320,036	66,950
Feb.	55,234	21,549,791	17.41	2,159	1,030,107	21.30	....	.....	....	57,393	434	211,323	56,959
Mar.	53,768	20,095,422	16.68	2,809	1,564,383	24.87	....	.....	....	56,577	562	245,780	56,015
Apr.	48,262	18,167,840	16.85	2,271	1,219,404	23.97	....	.....	....	50,533	315	165,632	50,218
May	51,243	18,827,018	16.40	2,191	1,105,887	22.54	....	.....	....	53,434	390	181,457	53,044
June	49,038	18,084,566	16.47	2,180	1,113,169	22.80	....	.....	....	51,218	471	226,882	50,747

Source: U. S. Department of Commerce.
Notes: (1) Figures for latex are on a dry weight basis. (2) Figures for re-exports include natural rubber (dry and latex) and guayule.

Natural Rubber
(Including Latex and Guayule)

(All Quantities in Long Tons)

Year	New Supply	Consumption	Re-Exports	Stocks On Hand at End of Period
1936	488,145	575,000	12,581	223,000
1937	600,479	543,600	7,902	262,204
1938	411,983	437,031	5,652	231,500
1939	499,473	592,000	13,125	125,800
1940	818,243	648,500	7,060	288,864
1941	1,029,007	775,000	5,376	533,344
1942	282,653	376,791	10,856	422,714
1943	55,329	317,634	20,815	139,594
1944	107,834	144,113	9,665	93,650
1945	135,672	105,429	6,743	118,715
1946	400,687	277,597	4,338	237,467
1947	688,354	562,661	4,101	129,038
1948	735,227	627,332	6,673	141,541
1947:				
Oct.	49,340	57,286	314	114,115
Nov.	50,840	52,076	514	110,752
Dec.	71,414	56,284	371	129,038
1948:				
Jan.	80,564	58,174	334	136,227
Feb.	54,418	51,012	290	148,081
Mar.	72,070	54,444	467	130,295
Apr.	40,947	50,616	343	123,248
May	40,709	52,022	1,031	112,724
June	64,725	55,701	718	119,818
July	63,775	48,769	466	128,446
Aug.	68,131	53,366	520	129,622
Sept.	50,556	52,131	514	123,912
Oct.	61,027	49,617	675	118,187
Nov.	50,671	51,632	746	113,251
Dec.	87,634	45,985	569	141,341
1949:				
Jan.	67,706	50,188	757	125,050
Feb.	57,401	46,285	434	118,803
Mar.	56,577	53,108	562	117,664
Apr.	50,533	47,859	315	112,916
May	53,510	46,128	390	111,875
June	51,218	47,117	471	103,626
July	.....	40,458	...	102,686

Source: 1936-40, U. S. Department of Commerce; 1941 to date, Rubber Division, OMD, and Predecessor Agencies.

U.S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.

(All Quantities in Long Tons)

	Balata		Jelutong		Gutta-Percha & Other Guttas	
Year	Tons	Value	Tons	Value	Tons	Value
1936	535	199,368	6,163	1,296,364	1,568	555,643
1937	354	151,344	7,109	2,017,786	1,122	440,894
1938	509	181,140	9,132	2,944,504	444	204,582
1939	694	265,553	6,640	1,603,418	1,740	539,255
1940	648	300,500	7,451	2,449,137	2,340	1,004,885
1941	924	489,514	8,821	2,954,001	1,783	607,025
1942	1,544	1,107,059	1,200	530,296	804	525,763
1943	1,047	708,701	35	14,840	....	.....
1944	1,012	660,805	86	45,578	10	4,999
1945	1,361	907,253	....	.....	36	21,970
1946	2,281	2,233,065	304	256,169	423	458,064
1947	1,982	2,276,531	2,878	1,496,887	392	779,591
1948	1,195	805,078	3,401	2,377,765	423	542,788
1947:						
Dec.	172	189,934	412	240,023	42	77,371
1948:						
Jan.	56	35,973	481	289,506	69	94,854
Feb.	145	90,023	307	209,015	66	84,839
Mar.	283	189,933	436	271,314	51	101,691
Apr.	82	36,570	651	393,280	52	68,366
May	45	36,109	512	314,432	24	54,191
June	67	36,885	277	211,373	45	41,277
July	120	87,327	205	170,949	15	35,001
Aug.	59	50,511	112	107,431	53	39,607
Sept.	91	67,970	112	83,432	0	0
Oct.	83	67,726	145	181,424	0	0
Nov.	86	49,155	48	36,634	20	10,572
Dec.	83	56,896	106	108,975	24	12,324
1949:						
Jan.	46	29,922	91	93,738	19	11,934
Feb.	65	53,665	77	91,362	9	16,328
Mar.	136	86,499	60	52,313	5	30,967
Apr.	88	48,244	14	8,753	16	9,878
May	103	60,361	85	83,291	....	.....
June	44	20,821	74	47,515	27	16,292

Source: U. S. Department of Commerce.

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Synthetic Rubber—Totals

(GR-S, Neoprene, Butyl, and Buna N Types)

(All Quantities in Long Tons)

Year	Production	Imports	Consumption	Exports	Stocks On Hand at End of Period
1941	8,383	.....	6,259	572	1,702
1942	22,434	.....	17,651	1,419	4,612
1943	231,722	.....	170,891	18,148	41,568
1944	762,630	11,043	566,670	104,266	142,927
1945	820,373	10,407	693,580	83,778	203,454
1946	740,026	7,709	761,699*	72,920	114,963
1947	508,702	1,093	559,566	11,385	62,366
1948	488,343	15,671	442,072	4,874	115,111
1948:					
Aug.	39,630	3,599	39,339	276	97,197
Sept.	37,890	2,403	39,215	628	98,246
Oct.	41,419	2,014	38,367	451	102,842
Nov.	40,779	1,988	37,690	366	107,297
Dec.	42,133	1,450	35,446	475	115,111
1949:					
Jan.	38,890	927	36,765	623	118,357
Feb.	36,103	1,170	34,611	335	118,932
Mar.	36,063	1,436	38,746	963	116,843
Apr.	35,445	881	36,454	506	114,944
May	32,335	1,402	35,267	619	112,739
June	31,953	1,127	36,949	513	106,813
July	34,270	....	30,009	...	113,803

Source: Rubber Division, OMD, and Predecessor Agencies.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (2) Figures shown include the output of both government and privately-owned plants. (3) Figures for 1941 are estimated. * Includes year-end adjustment of 5,384 tons to cover non-reporting companies.

Synthetic Rubber—By Type

(All Quantities in Long Tons)

New Supply

	GR-S (Buna S)	GR-M (Neoprene)	GR-I (Butyl)	Buna N Types	Total
1942	3,721	8,956	23	9,734	22,434
1943	182,259	33,603	1,373	14,487	231,722
1944	679,949	56,660	20,252	16,812	773,673
1945	724,859	45,672	52,378	7,871	830,780
1946	613,408	47,766	80,823	5,738	747,735
1947	408,858	31,495	62,824	6,618	509,795
1948	405,492	34,848	56,662	7,012	504,014

Consumption

1942	2,579	6,833	22	8,217	17,651
1943	131,977	26,205	304	12,405	170,891
1944	495,552	46,243	10,763	14,112	566,670
1945	600,145	42,394	43,012	8,029	693,580
1946	632,126	44,357	79,228	5,988	761,699
1947	448,589	37,703	68,838	4,536	559,666
1948	345,313	32,118	58,870	5,771	442,072

Exports

1942	222	1,037	..	160	1,419
1943	14,937	2,540	40	631	18,148
1944	98,380	4,799	530	557	104,266
1945	76,555	5,837	980	406	83,778
1946	68,763	2,642	495	797	72,697
1947	7,951	2,617	62	755	11,385
1948	1,093	2,875	21	885	4,874

Stocks at End of Period

1942	1,050	1,786	4	1,772	4,612
1943	30,975	6,415	1,033	3,145	41,568
1944	116,130	11,739	9,892	5,166	142,927
1945	170,571	9,703	18,378	4,802	203,454
1946	81,483	10,470	19,478	3,755	115,186
1947	40,606	5,237	13,184	3,339	62,366
1948	96,282	5,072	10,995	2,762	115,111

Source: Rubber Division, OMD, and Predecessor Agencies.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (2) Figures for GR-M and Buna N Types include production of privately-owned plants.

Gasoline Consumption

(In Thousands of Barrels of 42 Gallons)

	1942	1943	1944	1945	1946	1947	1948	1949
Jan.	49,216	36,085	47,540	52,008	51,746	57,057	61,308	63,083
Feb.	42,666	36,274	47,754	48,856	47,654	50,551	56,487	57,934
Mar.	50,820	41,586	52,263	55,364	56,703	59,947	68,171	73,118
Apr.	49,554	48,177	50,005	59,024	62,111	64,140	72,183	75,279
May	53,212	49,828	54,230	60,748	66,800	70,865	77,186	81,622
June	50,077	53,325	54,266	60,580	63,247	71,329	78,044	.....
July	54,606	49,867	55,119	66,170	60,076	73,441	81,428	.....
Aug.	48,793	51,880	55,618	70,058	66,729	72,089	80,351	.....
Sept.	50,093	49,707	56,318	64,529	62,268	71,384	76,159	.....
Oct.	50,094	53,111	53,154	55,708	66,637	73,277	75,164	.....
Nov.	50,729	50,703	54,967	53,543	61,345	64,158	72,560	.....
Dec.	39,250	48,695	52,250	49,745	61,101	67,506	72,162	.....
Total	589,110	568,238	633,482	696,333	735,417	795,015	871,200	.....

Source: U. S. Bureau of Mines.

Reclaimed Rubber

(Including Natural and Synthetic)

(All Quantities in Long Tons)

Year	Production	Consumption Tons	Consumption % to Crude [a]	Exports	Stocks On Hand at End of Period
1936	150,571	141,486	24.6	7,085	19,000
1937	185,033	162,000	29.8	13,233	28,800
1938	122,400	120,800	27.6	7,403	23,000
1939	186,000	170,000	28.7	12,611	25,250
1940	208,971	190,244	29.3	11,347	32,636
1941	274,202	251,231	32.2	13,851	41,750
1942	286,007[b]	254,820	64.6	30,405	42,532
1943	304,058[c]	291,082	59.6	15,678	46,201
1944	260,631[d]	251,083	35.3	11,800	43,832
1945	243,309	241,036	30.2	13,413	28,155
1946	295,612	275,410	26.5	14,461	33,666
1947	291,395	288,395	24.8	14,556	35,943
1948	266,861	261,113	24.4	11,428	32,630
1948:					
May	21,043	21,975	25.2	948	36,612
June	22,504	23,786	25.1	925	35,898
July	17,712	19,291	23.2	712	34,302
Aug.	20,255	22,917	24.7	643	32,025
Sept.	21,805	23,478	25.7	740	30,198
Oct.	23,859	23,512	26.7	848	31,879
Nov.	23,050	22,170	24.8	1,210	33,378
Dec.	21,396	20,122	24.9	900	34,702
1949:					
Jan.	19,741	19,031	21.9	991	32,868
Feb.	18,270	17,712	21.9	1,012	32,738
Mar.	19,991	19,508	21.2	1,054	33,397
Apr.	18,463	18,649	22.1	1,070	32,825
May	18,184	18,323	22.5	887	32,326
June	18,849	19,316	23.0	694	30,684
July	14,612	16,019	22.7	...	29,274

Source: 1936-40, Department of Commerce; 1941 to date, Rubber Division, OMD, and Predecessor Agencies.

Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. [a] Includes natural and synthetic rubber. [b] Includes 893 tons of imports. [c] Includes 67 tons of imports. [d] Includes 21 tons of imports.

Automobile Production in U. S.

(Civilian Production Only)

Year	Passenger Cars	Trucks	Total	Year	Passenger Cars	Trucks	Total
1930	2,784,745	571,241	3,355,986				
1931	1,973,090	416,648	2,389,738	1940	3,692,328	721,637	4,413,965
1932	1,135,491	235,187	1,370,678	1941	3,744,500	875,381	4,619,681
1933	1,573,512	346,545	1,920,057	1942	220,814	133,083	353,897
1934	2,177,919	575,192	2,753,111	1943	0	4,501	4,501
1935	3,252,244	694,690	3,946,934	1944	0	124,819	124,819
1936	3,669,528	781,862	4,451,390	1945	83,792	313,643	397,435
1937	3,915,889	892,382	4,808,271	1946	2,148,699	930,760	3,079,459
1938	2,000,985	485,852	2,486,837	1947	3,558,178	1,220,634	4,778,812
1939	2,866,796	704,308	3,571,104	1948	3,909,270	1,363,856	5,273,126
1948:							
Jan.	305,081	99,200	404,281	July	356,764	116,780	473,544
Feb.	274,847	107,054	381,901	Aug.	348,782	111,760	460,542
Mar.	349,998	140,606	490,604	Sept.	301,170	111,224	412,394
Apr.	308,071	128,963	437,034	Oct.	383,756	107,352	491,108
May	225,461	111,789	337,250	Nov.	364,440	103,837	468,277
June	312,406	117,572	429,978	Dec.	378,455	107,702	486,157
1949:							
Jan.	326,019	104,599	430,618	July	483,261	95,348	578,609
Feb.	324,547	101,700	426,247	Aug.	.....	.....	.....
Mar.	402,402	115,171	517,573	Sept.	.....	.....	.....
Apr.	436,392	106,212	542,604	Oct.	.....	.....	.....
May	394,703	86,200	480,903	Nov.	.....	.....	.....
June	493,882	99,126	593,008	Dec.	.....	.....	.....

Source: Automobile Manufacturers Association.

Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

Rim Production

	1944	1945	1946	1947	1948
Passenger Car	1,748,917	4,504,368	15,058,469	21,346,004	23,842,796
Truck & Bus	6,391,441	6,386,652	5,939,244	7,737,353	6,920,231
Agricultural	997,301	1,441,909	1,735,992	2,633,699	3,140,882
Earth Mover	703	1,308	5,520	10,610	13,330
Total	9,138,362	12,434,237	22,739,225	31,727,666	33,917,239

	1949					
	Feb.	Mar.	Apr.	May	June	July
Passenger Car	1,847,304	2,277,001	2,276,658	2,337,844	2,660,576	2,260,020
Truck & Bus	497,135	516,577	362,643	359,700	293,872	344,984
Agricultural	283,344	310,204	242,123	205,805	216,695	154,913
Earth Mover	1,797	757	478	1,055	1,157	964
Total	2,629,580	3,104,539	2,881,902	2,904,404	3,172,300	2,760,881

Source: The Tire & Rim Association, Inc.

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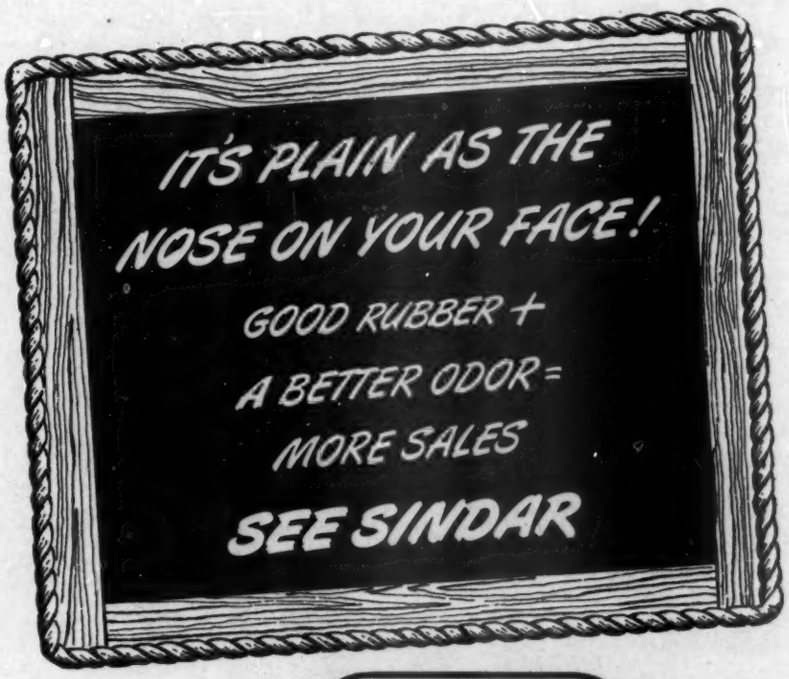

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(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1937 (total)	22,353	29,886	1,246	53,485	53,310	10,383
Passenger Car	20,055	26,177	696	46,928	46,497	8,745
Truck and Bus	2,298	3,709	550	6,557	6,813	1,638
1938 (total)	11,516	30,567	1,049	43,132	40,907	8,451
Passenger Car.	10,086	27,104	580	37,770	35,789	6,937
Truck and Bus	1,430	3,463	469	5,362	5,118	1,514
1939 (total)	18,208	38,022	1,279	57,509	57,613	8,665
Passenger Car.	15,742	33,471	607	49,820	49,933	7,108
Truck and Bus	2,466	4,551	672	7,689	7,680	1,557
1940 (total)	22,252	35,346	1,176	58,774	59,186	9,127
Passenger Car.	19,560	30,903	411	50,874	50,965	7,270
Truck and Bus	2,692	4,443	765	7,900	8,221	1,857
1941 (total)	24,780	39,895	1,489	66,164	61,540	4,436
Passenger Car.	19,855	34,119	586	54,560	50,392	3,165
Truck and Bus	4,925	5,776	903	11,604	11,148	1,271
1942 (total)	6,680	8,872	207	15,759	15,351	6,247
Passenger Car.	910	2,734	38	3,682	2,790	4,432
Truck and Bus	5,770	6,138	169	12,077	12,561	1,815
1943 (total)	6,128	18,547	225	24,900	20,423	1,883
Passenger Car.	82	10,606	71	10,759	7,620	1,132
Truck and Bus	6,046	7,941	154	14,141	12,803	751
1944 (total)	6,654	26,439	263	33,356	33,446	2,013
Passenger Car.	208	18,330	130	18,668	18,819	1,218
Truck and Bus	6,446	8,109	133	14,688	14,627	795
1945 (total)	5,984	36,479	504	42,967	44,524	3,077
Passenger Car.	1,115	25,463	222	26,800	28,200	2,214
Truck and Bus	4,869	11,016	282	16,167	16,324	863
1946 (total)	15,310	65,490	1,512	82,312	82,298	2,448
Passenger Car.	11,086	54,684	653	66,423	66,466	1,763
Truck and Bus	4,224	10,806	859	15,889	15,832	685
1947 (total)	25,056	62,871	3,256	91,183	95,550	6,949
Passenger Car.	19,644	52,857	1,608	74,109	77,795	5,444
Truck and Bus	5,412	10,014	1,648	17,074	17,755	1,505
1948 (total)	26,845	49,148	1,787	77,781	81,314	10,698
Passenger Car.	21,589	41,295	656	63,540	66,738	8,773
Truck and Bus	5,256	7,853	1,132	14,241	14,576	1,925
1949:						
Mar. (total)	2,519	3,229	155	5,903	6,578	13,091
Passenger Car.	2,156	2,693	49	4,899	5,361	16,670
Truck and Bus	363	536	105	1,005	1,216	2,421
Apr. (total)	2,771	3,718	121	6,611	6,959	13,190
Passenger Car.	2,427	3,202	38	5,667	5,940	10,705
Truck and Bus	345	516	84	944	1,020	2,485
May (total)	2,380	4,324	120	6,824	6,934	13,301
Passenger Car.	2,103	3,764	41	5,909	5,981	10,769
Truck and Bus	277	559	79	915	953	2,532
June (total)	3,234	4,185	116	7,535	7,391	13,134
Passenger Car.	2,928	3,635	36	6,599	6,471	10,618
Truck and Bus	307	550	80	937	921	2,515

Source: The Rubber Manufacturers Association, Inc.

Cotton, Rayon and Nylon Tire Fabrics

(Production in Thousands of Pounds)

	Cotton				Rayon and Nylon [b]		
	Tire Cord Not Woven	Cord Fabric Woven	Chafer and All Other Tire Fabrics	Total	Tire Cord Not Woven	Tire Cord And Other Tire Fabrics	Total
1946:							
Jan.-Mar.	17,128	39,377	15,245	71,750	a	51,208	51,208
Apr.-June	19,622	40,197	18,623	78,442	a	52,511	52,511
July-Sept.	17,279	39,259	18,787	75,325	5,102	46,932	52,034
Oct.-Dec.	20,660	42,668	21,708	85,036	5,858	50,589	56,447
Total	74,689	161,501	74,363	310,553	10,960	201,240	212,200
1947:							
Jan.-Mar.	21,972	49,377	21,815	93,164	5,322	52,059	57,381
Apr.-June	23,491	53,746	16,480	93,717	5,486	47,360	52,846
July-Sept.	15,571	44,291	14,596	74,458	6,161	51,719	57,880
Oct.-Dec.	18,183	48,532	17,762	84,477	6,550	55,078	61,628
Total	79,217	195,946	70,653	345,816	23,519	206,216	229,735
1948:							
Jan.-Mar.	18,546	50,251	19,391	88,188	a	60,569	60,569
Apr.-June	15,585	45,385	18,213	79,183	a	59,759	59,759
July-Sept.	29,743	45,927	c	75,670	a	63,642	63,642
Oct.-Dec.	13,321	34,424	15,879	63,624	a	65,258	65,258
Total	77,195	175,987	53,483	306,665	.....	249,228	249,228
1949:							
Jan.-Mar.	d	33,213	26,494	59,707	a	68,926	68,926
Apr.-June	.....	.....	.....	.....	.....	.....	.....
July-Sept.	.....	.....	.....	.....	.....	.....	.....
Oct.-Dec.	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	.....	.....	.....

Source: U. S. Bureau of the Census.

Notes: (a) Included with tire cord and fabrics to avoid disclosures of operations of individual mills. (b) Fuel cell fabrics are not included with rayon and nylon tire cord and fabrics. (c) Included with tire cord not woven. (d) Included with chafer and all other tire fabrics.

Automotive Inner Tubes

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1936	21,514	32,188	721	54,423	57,036	10,945
1937	22,464	29,554	749	52,767	52,373	10,312
1938	11,515	28,134	644	40,293	37,848	8,166
1939	18,190	31,998	1,002	51,190	50,649	7,036
1940	22,172	29,070	972	52,214	52,237	7,017
1941	24,722	33,749	1,232	59,703	57,433	4,686
1942	6,895	7,213	159	14,267	12,685	6,206
1943	6,350	12,474	189	19,014	15,014	2,626
1944	6,460	20,569	196	27,224	27,488	2,813
1945	5,988	33,906	411	40,304	41,742	3,627
1946	15,327	59,357	1,424	76,108	77,251	3,820
1947	25,046	46,560	2,483	74,088	79,181	8,059
1948	26,839	40,494	1,125	68,457	70,150	9,734
1948:						
Nov.	2,344	2,694	86	5,123	5,463	9,303
Dec.	2,290	2,308	124	4,722	5,034	9,734
1949:						
Jan.	2,298	2,531	97	4,926	5,062	9,815
Feb.	2,168	2,160	76	4,404	4,922	10,442
Mar.	2,513	2,565	95	5,174	5,948	11,231
Apr.	2,767	2,552	78	5,396	6,059	11,748
May	2,380	2,830	87	5,296	6,088	12,410
June	3,231	3,106	72	6,409	6,430	12,466

Source: The Rubber Manufacturers Association, Inc.

Smoked Sheets—Spot Closing Prices

(New York Market—Cents per pound)

Year	High	Low	Avg.	Year	High	Low	Avg.
1910	288	141	206.60	1930	16½	7½	11.98
1911	184	114	141.30	1931	8⅝	4¼	6.17
1912	140	108	121.60	1932	4¼	2½	3.49
1913	113	59	82.04	1933	9⅞	2⅜	5.96
1914	93	56	65.33	1934	15⅞	8¾	12.92
1915	79	58½	65.85	1935	13¾	10½	12.37
1916	102	55	72.50	1936	23	13½	16.41
1917	90	52	72.23	1937	26¾	14	19.39
1918	70	40	60.15	1938	17⅛	10¼	14.64
1919	57	38½	48.70	1939	24	14⅛	17.57
1920	56½	16	36 30	1940	24	18¾	20.10
1921	21¼	11½	16.36	1941	24⅞	19¼	22.40
1922	28⅜	13⅜	17.50	1942	22½	22½	22.50
1923	37⅛	24¾	29.45	1943	22½	22½	22.50
1924	40⅝	17⅜	26.20	1944	22½	22½	22.50
1925	121	34⅜	72.46	1945	22½	22½	22.50
1926	88½	36¾	48.50	1946	22½	22½	22.50
1927	41¾	33	37.72	1947	25	14	20.00
1928	41¾	17	22.48	1948	25	18	21.99
1929	26⅞	15½	20.55				

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses. Free trading was resumed May 1, 1947.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market—in Cents)

Average Monthly Price Per Pound

	1942	1943	1944	1945	1946	1947	1948	1949
Jan.	19.85	21.34	20.76	22.36	25.49	32.58	36.09	33.37
Feb.	20.05	21.61	21.34	22.29	26.57	33.91	33.63	33.41
Mar.	20.42	21.98	21.65	22.43	27.52	35.89	35.04	33.44
Apr.	21.10	22.02	21.71	21.88	28.40	35.89	38.10	33.84
May	20.88	21.97	21.63	23.30	28.17	36.51	38.57	33.73
June	19.78	21.92	23.31	23.42	29.89	37.83	38.12	33.56
July	20.27	21.46	22.33	23.27	34.11	38.03	34.89	32.99
Aug.	19.45	21.09	22.11	23.10	36.31	34.83	32.23	32.06
Sept.	19.62	21.10	22.10	23.25	37.59	32.21	31.92	....
Oct.	19.79	21.00	22.32	23.85	36.79	32.39	32.01	....
Nov.	20.21	20.32	22.13	24.71	31.50	34.50	32.15	....
Dec.	20.55	20.32	22.28	25.21	33.03	36.74	32.90	....
Average for Year	20.16	21.34	21.89	23.25	31.28	35.11	34.64	....

Consumption of Vinyl Resins

(In Thousands of Pounds)

	Sheeting and Film [a]	Textile and Paper Coating Resins [b]	Molding and Extrusion Materials [b]	All Other [b, c]
1946	52,080	11,673	61,852	27,083
1947	66,430	17,237	73,114	27,064
1948	98,021	31,085	73,598	41,147
1948:				
Nov.	10,099	2,588	6,533	2,014
Dec.	8,761	2,472	7,068	1,808
1949:				
Jan.	10,197	2,847	6,834	2,589
Feb.	9,368	1,979	5,569	2,148
Mar.	11,787	2,384	5,660	2,387
Apr.	13,600	2,489	4,775	1,694
May	10,986	2,212	4,817	1,406
June	10,827	2,177	5,592	1,136

Source: Bureau of the Census.

Notes: (a) Includes weight of fillers, plasticizers, extenders and safety glass sheeting; (b) Resin content; (c) Includes Adhesives, but excludes data for protective coating resins.

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NOW Calcined Magnesia in LUMP FORM– GENMAG TECHNICAL for improved scorch resistance in neoprene compounding.

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There has always been loss of efficiency when calcined magnesia has been pulverized into a powder, for the powder has great affinity for moisture and carbon dioxide — which lower its scorch resistance in neoprene compounding. So now General Magnesite & Magnesia Company has made available calcined magnesia in *lump* form.

To further safeguard this lump magnesia from deterioration by contact with carbon dioxide and moisture while in transit or storage, it is packaged in heat-sealed polyethylene bags.

Dispersion in compoundings is equal to that of powdered magnesia.

Disinterested tests show that stresses in Banbury Mixers and rubber mills are so great that dispersion of lump magnesia is equal to dispersion of GENMAG TECHNICAL powdered magnesia, and scorch resistance is greatly improved.

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Rubber Industry Employment, Payrolls, Wages and Hours

Employment — Thousands of Production Workers and Index (1939 = 100)

	1948				1949			
	All Rubber Products		Rubber Tires & Tubes		All Rubber Products		Rubber Tires & Tubes	
Month	Number	Index	Number	Index	Number	Index	Number	Index
Jan.	210	173.5	101	185.5	191	157.8	88	163.0
Feb.	208	172.0	99	182.4	187	154.5	87	159.5
Mar.	204	168.9	96	177.7	183	151.0	86	158.2
Apr.	198	163.8	93	170.7	179	147.8	86	158.1
May	195	161.1	91	168.5	174	144.2	84	155.5
June	195	161.6	92	169.4	172	142.3	..	....
July	191	157.7	91	167.6	...	....	..	....
Aug.	195	160.9	92	168.7	...	....	..	....
Sept.	197	162.8	91	168.6	...	....	..	....
Oct.	198	163.5	90	165.9	...	....	..	....
Nov.	199	164.5	91	168.2	...	....	..	....
Dec.	196	161.8	90	165.3	...	....	..	....

Note: Figures from June, 1947, to date have been revised to adjust them to levels indicated by Federal Security Agency data for 1946; revisions for January-May, 1947, will be shown later.

Payrolls — Production Workers Pay Rolls Unadjusted Index (1939 = 100)

	1947		1948		1949	
Month	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes
Jan.	386.3	416.3	354.9	344.4	320.6	294.5
Feb.	385.0	413.3	337.2	315.4	309.8	288.8
Mar.	374.3	397.3	320.6	292.4	298.4	287.8
Apr.	383.9	414.2	312.8	286.4	291.4	285.2
May	367.2	399.3	318.9	305.7	294.5	292.9
June	342.3	356.2	330.2	322.0	....	....
July	331.2	350.0	329.7	329.8	....	....
Aug.	337.6	355.5	347.2	341.0	....	....
Sept.	348.3	355.3	344.9	326.2	....	....
Oct.	354.4	354.7	345.5	318.2	....	....
Nov.	361.4	362.4	341.9	312.9	....	....
Dec.	373.6	365.6	332.7	299.6	....	....

Note: Figures from June, 1947, to date have been revised to adjust them to levels indicated by Federal Security Agency data for 1946; revisions for January, 1946, through May, 1947, will be shown later.

Wages — Average Weekly Earnings

	1947		1948		1949	
Month	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes
Jan.	$54.03	$59.78	$57.33	$62.72	$56.89	$60.78
Feb.	54.06	59.90	54.70	58.22	56.33	61.21
Mar.	52.97	58.05	53.24	55.54	55.61	61.56
Apr.	55.23	61.64	53.39	56.54	55.35	60.92
May	55.30	61.12	55.45	61.15	57.00	63.54
June	55.49	61.35	57.14	63.96	58.71	....
July	55.74	62.06	58.37	66.30	....	....
Aug.	55.92	61.15	60.47	68.29	....	....
Sept.	57.76	64.75	59.31	65.27	....	....
Oct.	57 62	63.78	59.19	64.82	....	....
Nov.	57.99	64.86	58.27	62.79	....	....
Dec.	59.47	65.74	57.68	61.10	....	....

Wages — Average Hourly Earnings

	1947		1948		1949	
Month	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes	All Rubber Products	Rubber Tires & Tubes
Jan.	$1.330	$1.511	$1.444	$1.646	$1.501	$1.721
Feb.	1.331	1.517	1.421	1.613	1.502	1.723
Mar.	1.330	1.512	1.408	1.599	1.499	1.719
Apr.	1.397	1.608	1.412	1.603	1.504	1.721
May	1.416	1.622	1.424	1.636	1.512	1.740
June	1.419	1.615	1.439	1.651	1.533	....
July	1.445	1.640	1.472	1.684	....	....
Aug.	1.445	1.640	1.500	1.730	....	....
Sept.	1.447	1.661	1.504	1.732	....	....
Oct.	1.436	1.644	1.507	1.734	....	....
Nov.	1.453	1.661	1.508	1.735	....	....
Dec.	1.454	1.658	1.499	1.721	....	....

Hours — Average Weekly Hours per Worker

Month	1947	1948	1949	Month	1947	1948	1949
January	40.6	39.7	37.9	July	38.6	39.7	...
February	40.6	38.5	37.5	August	38.7	40.3	...
March	39.8	37.8	37.1	September	39.9	39.4	...
April	39.5	37.8	36.8	October	40.1	39.3	...
May	39.0	39.0	37.7	November	39.9	38.6	...
June	39.1	39.7	38.3	December	40.9	38.5	...

Source: U. S. Department of Commerce. Note: These figures are revised from time to time and the latest available issue should be consulted for the most accurate data.

Indexes of Production, Shipments and Inventory For The Rubber Industry

Production 1935-1939 = 100 (Based on man-hours)

Month	1947	1948	1949	Month	1947	1948	1949
Jan.	247	223	193	July	207	200	...
Feb.	246	215	188	Aug.	210	207	...
Mar.	239	205	182	Sept.	217	205	...
Apr.	234	200	177	Oct.	223	205	...
May	220	201	178	Nov.	225	203	...
June	216	205	179	Dec.	230	200	...

Shipments—Average Month 1939 = 100 (Based on $ Value)

Jan.	301	282	291	July	298	339	...
Feb.	326	289	283	Aug.	312	351	...
Mar.	332	252	285	Sept.	346	345	...
Apr.	320	312	287	Oct.	354	344	...
May	309	317	307	Nov.	354	322	...
June	322	342	...	Dec.	307	318	...

Inventory — Average Month 1939 = 100 (Based on $ Value)

Jan.	229	271	295	July	268	289	...
Feb.	241	283	300	Aug.	258	287	...
Mar.	253	302	302	Sept.	246	288	...
Apr.	270	293	303	Oct.	247	284	...
May	279	296	299	Nov.	242	288	...
June	277	295	...	Dec.	257	289	...

Source: U. S. Department of Commerce.

Various Compounding Materials Consumed by the Rubber Industry

Material	1942	1943	1944	1945	1946	1947	1948
Asphalt [a]							
Short tons	22,263	16,510	20,189	19,483	28,715	32,113	.....
% of total	0.6	0.5	0.6	0.5	0.7	0.7	..
Barite (Barytes):							
Short tons	6,334	8,000	10,000	10,000	20,000	17,000	18,000
% of total	3.6	3.9	2.9	2.1	4.4	3.1	2.85
Carbon Black:							
Short tons	147,974	236,737	369,015	402,193	470,732	471,790	424,038
% of total	88.5	90.3	94.6	95.5	95.3	94.3	91.0
Clay, Kaolin:							
Short tons	51,334	50,964	59,588	109,936	162,393	166,201	176,965
% of total	5.1	5.5	6.8	11.7	12.3	11.5	11.3
Clay, Fire & Stoneware:							
Short tons	5,000	10,259	7,160	7,800	12,951	17,970	15,480
% of total	0.1	0.2	0.1	0.1	0.2	0.2	0.2
Lead Sulfate, Basic:							
Short tons	89	131	268	200	.....	.....	.....
% of total	1.1	2.3	4.2	5.2	..	..	..
Lime:							
Short tons	1,381	2,039	5,634	7,170	3,193	589	.....
% of total	0.02	0.05	0.13	0.10	0.1	0.01	..
Litharge:							
Short tons	3,460	4,302	3,023	1,864	2,131	2,205	2,835
% of total	3.8	3.8	2.2	1.3	1.6	1.3	1.8
Lithopone:							
Short tons	1.047	1,078	726	977	1,607	3,085	4,192
% of total	0.8	0.8	0.5	0.7	1.1	1.9	3.0
Mica, Ground:							
Short tons	1,754	3,063	1,137	3,715	4,951	3,900	.....
% of total	3.7	6.0	2.2	7.1	8.0	6.0	..
Sulfur:							
Short tons	40,000	51,000	63,000	64,960	72,800	72,800	70,560
% of total	1.4	1.8	1.9	2.0	2.2	1.8	1.7
Talc [b]							
Short tons	40,487	48,994	51,833	63,758*	65,980	71,840	.....
% of total	10.0	11.8	13.0	16.0	14.4	13.9	..
Zinc Oxide:							
Short tons	52,717	67,898	59,518	63,447	83,776	82,248	82,895
% of total	53.0	47.4	42.3	49.6	53.1	51.2	54.9

Source: U. S. Bureau of Mines.
Notes: (a) Solid and semi-solid products of less than 200 penetration. (b) Includes pyrophyllite and ground soapstone. * Revised.

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DEVELOPMENT ENGINEER with eighteen years background in mold and product design, general sales engineering and inspection for major rubber companies. Entirely familiar with compression, transfer, injection molding and extrusion processes. Desires change. Member of Society of the Plastics Industry. Interested in sales engineering or production administration. Salary commensurate with opportunities. Address Box 530-P, RUBBER AGE.

RUBBER EXECUTIVE, retired, Ohio Registered Professional Engineer, desires part or full time work in Consulting, Sales Engineering, Inspection of Industrial Products to meet specifications, etc. Address Z. E. Sargisson, 1080 Delia Ave., Akron 20, Ohio.

RUBBER CHEMIST well experienced in all phases of this industry (twenty years experience) seeks employment with progressive company. 45 years old, Ph.D., also interested in technical sales. Address Box 534-P, RUBBER AGE.

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WANTED: Complete rubber plants. Also individual items such as: 2-roll mills, calenders, mixers and Banbury Mixers. R. GELB & SONS, INC., State Highway No. 29, Union, New Jersey.

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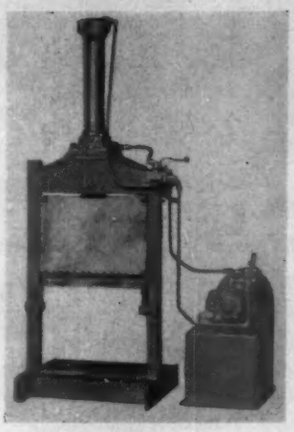

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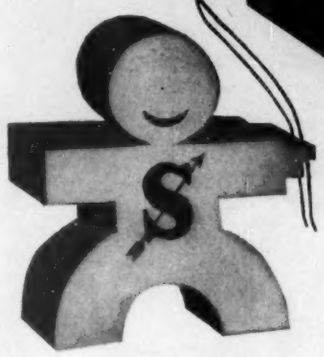

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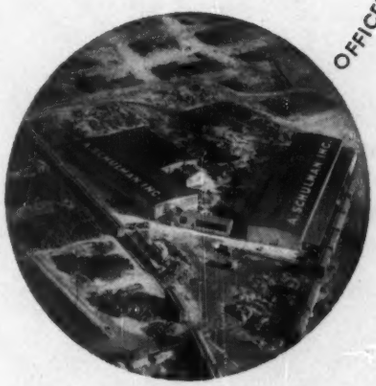

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Truck Beadless Tires;
No. 1 Peels, Natural Rubber, GR-S or Recap;
No. 2 Peels, Natural Rubber, GR-S or Recap;
No. 3 Peels, Natural Rubber, GR-S;
S.A.G. — Passenger and Truck, Natural Rubber and GR-S;
Light-colored Carcass, natural rubber;
Mixed Automobile Inner Tubes;
Graded Inner Tubes;
Pure Gum Cured Scrap;
Tire Buffings;
Airbags;
Airbags, light-colored;
Airbag Buffings;
Black Mechanical Scrap, natural rubber;
Black Mechanical Scrap, GR-S;
Black Mechanical Scrap, light-gravity rubber;
Bathcap Scrap, white natural rubber;
Bathcap Scrap, mixed colored natural rubber;
Water Bottle and Drug Sundry, natural rubber;
Water Bottle and Drug Sundry, GR-S;
Mechanical Trimmings, light-colored scrap, natural rubber;
Mechanical Trimmings, light-colored scrap, GR-S;
Light-colored Threads, natural rubber;
Airfoam Sponge, natural rubber;
Mixed Colored Sponge;
Heel and Sole Trimmings.

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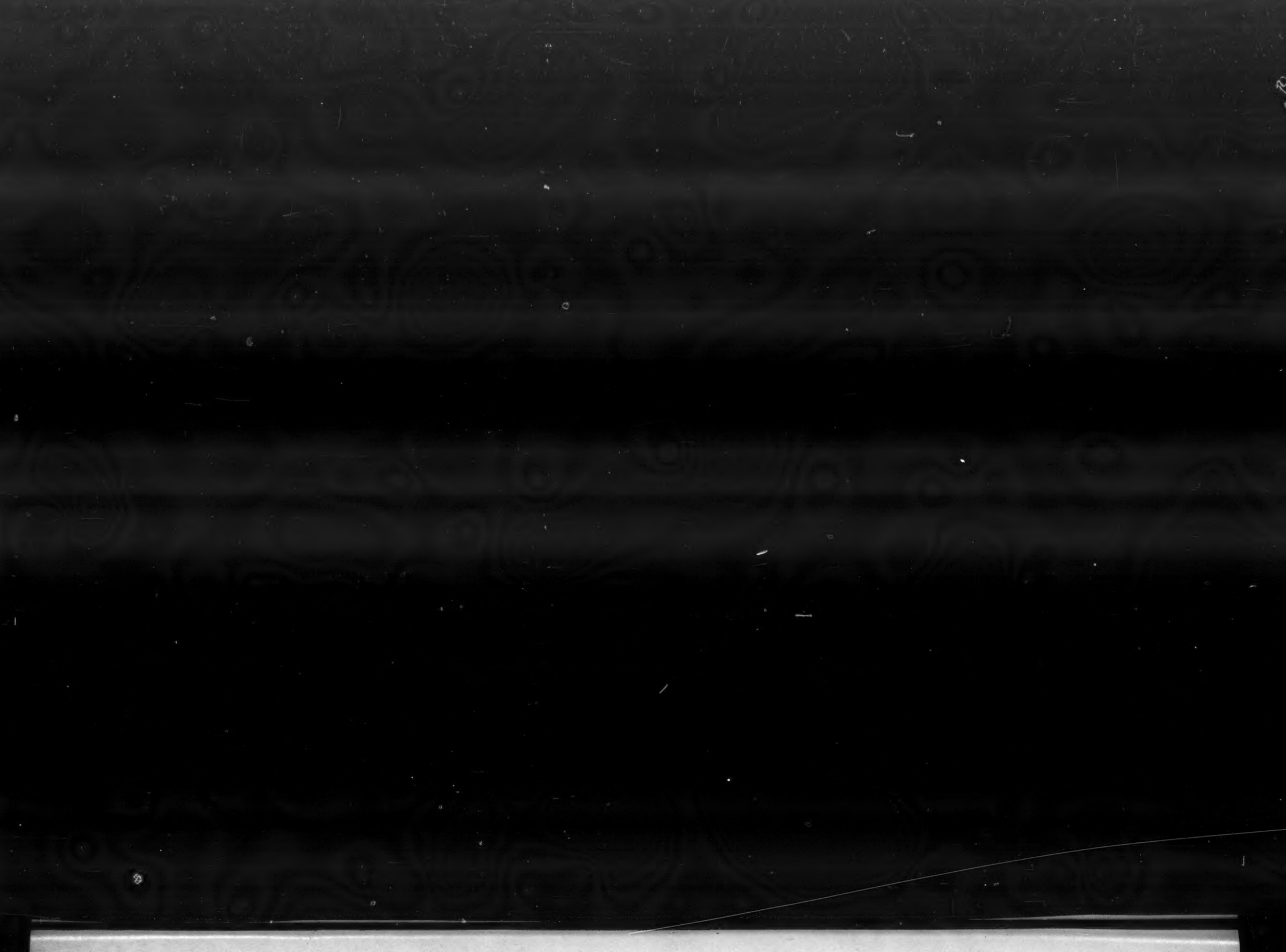

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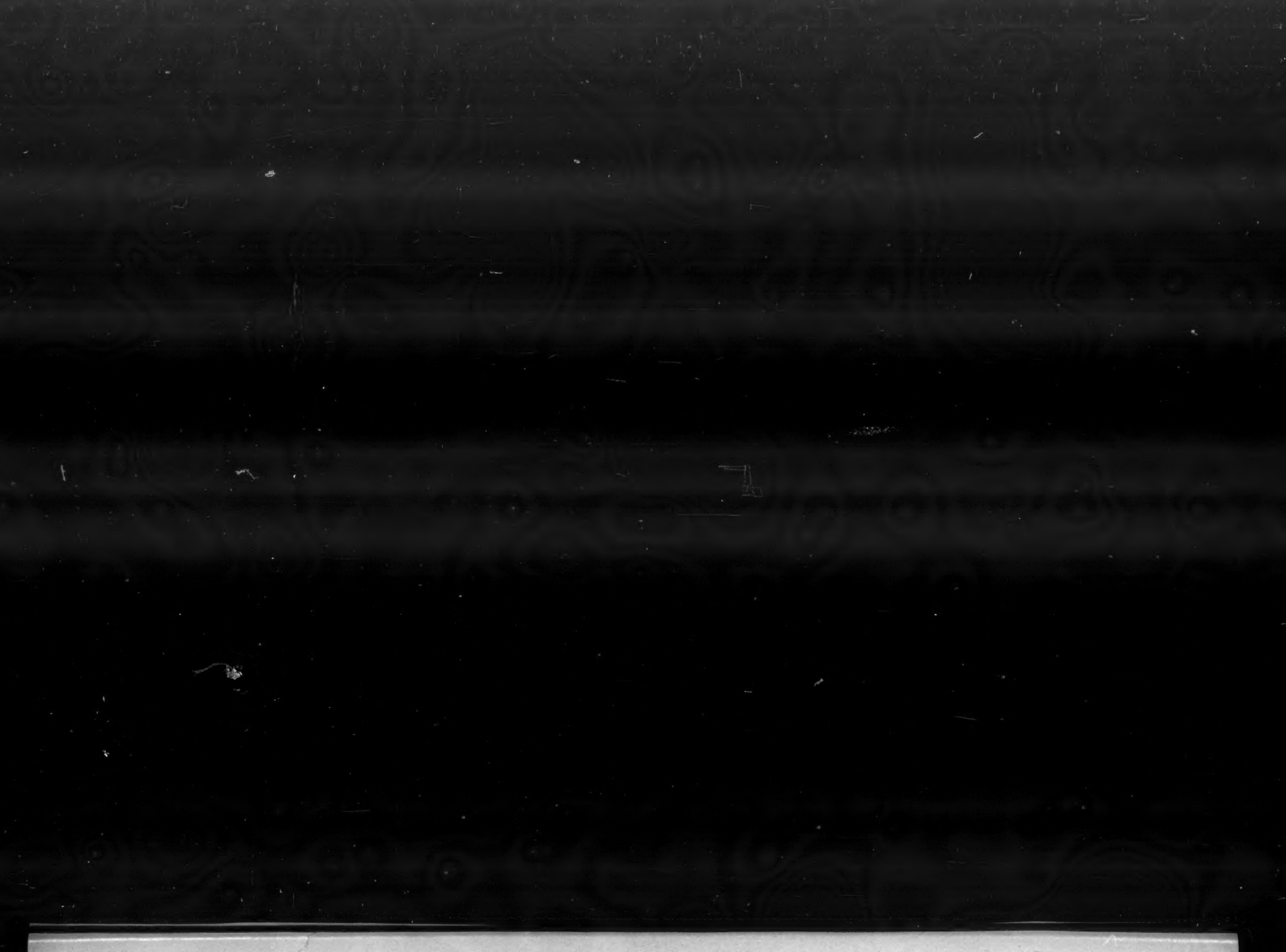
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